



FRIDAY, APRIL 4.

## The First Five Years of the Railroad Era.

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[The article that follows had its origin in my having accepted the special invitation of the Commissioners of the "National Exposition of Railway Appliances," to be held in Chicago in June, 1883, to visit the exhibition, and at the appropriate time present such reference to early railroad development as circumstances permitted. My friends of the *Railroad Gazette* informed me that in such event they would have stenographic notes taken for a report that would appear in their paper.

When the time came, circumstances did not permit so full a presentation as the subject called for, and on the receipt of the report prepared for the *Gazette* I decided to make it more complete, and that what was thus summarily presented might meet the eyes of many to whom it would be of interest in this land, where the railroad era has perhaps its greatest development, to have it also before the public in pamphlet form. HORATIO ALLEN.

HOMEWOOD,  
South Orange, N. J.]

By the railroad era is meant the era commencing with the permanent and successful use of the locomotive on the Stockton & Darlington Railroad, in England, in the year 1825, that has seen within less than 60 years the iron track laid in so many lands, on which locomotives are performing their great work in the transportation of passengers and freight.

The time and circumstances of the professional life of a civil engineer had placed me early in the field, as the era opened, and thus of necessity occurred a personal knowledge of the very beginning of the era in England as well as in this country.

Although often requested, and sometimes by formal resolutions of societies of which I have had the honor to be president, to commit to print what was on many occasions the subject of interesting reminiscences, I have omitted to this late day these summary statements, in part, perhaps, for the reason that they are in so much of a personal character.

But recently an occurrence led me to put these reminiscences into some connected relation, which, being made more complete, the following pages are placed before the public. It is proposed to present the facts, occurrences, and decisions in their order of the five years that followed the introduction of the locomotive on the Stockton & Darlington road in England, in September, 1825. During that period was determined essentially the character of the development of the railroad era, in all of which this country took an early and active part.

As preliminary to setting forth what occurred in the period named it is of direct interest to go back to the invention that made a locomotive possible.

*The Condensing Steam-engine not the Locomotive Engine.*—It will be recollected that the first use of steam to do work was in co-operation with the atmosphere to raise water from the bottom of a mine, some 25 ft., and then to force the water many more feet to the surface.

The successive improvements in this water-raising use of steam, in co-operation with the atmosphere, led, when the invention of Newcomen came into the hands of Watt, to the condensing steam-engine. In that engine steam was used at a pressure of only 7 lbs. to the square inch greater than the pressure of the atmosphere, and water in large quantity was necessary for condensing the steam. The condensing steam-engine was therefore entirely inapplicable as a motive power on a railroad. The locomotive, therefore, does not date back to the steam-engine as it came from the hands of Watt.

*The High-pressure Engine, the Non-condensing Engine, the Locomotive Engine.*—It is remarkable that the condensing steam engine of Watt, being the subject of a patent, and its use only to be had on payment of a large patent fee, it was only when that patent was nearly at its close, that some one had the boldness to use steam of so great a pressure as to bid defiance to the resistance of the atmosphere, and to plan and build an engine of the extreme simplicity that is the case when the steam, on leaving the cylinder, forces the atmosphere out of its way and is condensed in the open air. About the year 1800, the boiler, engine and appurtenances that made the high-pressure engine, an engine that was to use steam of 50 lbs. pressure instead of 7 lbs., and therefore relatively a high-pressure engine, was the subject of a patent issued to Trevithick and Vivian; and not long afterward a high-pressure engine, boiler and appurtenances were constructed and set to work. They were followed by the application of the high-pressure engine and boiler to turn the wheels of a carriage that carried boiler, engine, etc., the object being to use steam

Evans constructed and used was a multitubular boiler, but differing from the multitubular boiler now the established boiler of the locomotive, in the particular that in the Evans boiler the water was in the tubes, and the products of combustion passed between the tubes, whereas in the present locomotive boiler the products of combustion pass through the tubes and water surrounds them. What was accomplished by Oliver Evans had all the elements of a permanent success.

Had Evans had a Bolton, as Watt had a co-operating Bolton, or a Pease, as George Stephenson had his Pease as a co-operator, the high-pressure steam-engine, both as a stationary and as a tractive motive power, would have had a position from that time of great interest to this country, and through this country to the world; but no such aid coming from individual or state, vainly applied to, there is only the record of what might have been—another of the many cases where the inventor was ready, but the age was not.

*Stephenson's Killingworth Locomotive, 1814.*—In 1814 George Stephenson placed on the mine railroad at Killingworth, near Newcastle, a locomotive in all its essential parts and combinations.

At that time the high-pressure engine had become known to such extent that Stephenson probably was not the inventor of the high-pressure engine, which formed so vital a part of his combination.

Although in daily use for several years this locomotive did not attract attention. Its inefficient operation was due mainly to the use of a boiler of limited steam-making capacity.

## THE OPENING OF THE RAILROAD ERA.

*Stephenson's Stockton & Darlington Locomotive, September, 1825.*—But the time came when the construction of the Stockton & Darlington Railroad, a coal-mine railroad, under the direction of Stephenson, afforded the opportunity for the locomotive, and with the opportunity came the co-operating man. That man was Pease, a member of the Society of Friends. Mr. Pease had a large interest in the Stockton & Darlington Railroad, and was so much impressed by the statement and explanation of Stephenson as to what was done and what might be done by the locomotive, as a tractive motive power, that, accompanied by Stephenson, he went to the Killingworth mine railroad to inform himself as to the locomotive at work there.

The result of this visit was that Mr. Pease, a friend of Mr. Pease, and Mr. Stephenson, united in providing the money for the construction of the locomotive that was put to work on the Stockton & Darlington road in September, 1825, and its success opened the railroad era.

The performance of this locomotive, although satis-

factory to a great degree to the parties especially interested, again made known that the boiler was not yet of the steam-making capacity that could be had of a weight not exceeding the limit of weight admissible on a railroad. The attention thus excited had as one result the multitubular boiler, the invention of Mr. Booth, of the Liverpool & Manchester road, then in process of construction, and also the boiler proposed by John U. Rastrick, of Stourbridge, which may be called the many-flue boiler, using riveted flues of as small diameter as could be made by riveting.

In the year 1827 the locomotives on the Stockton & Darlington road were doing their daily work. The advocates of the locomotive as the future motive power were claiming the greater results that were to attend the use of boilers of greater efficiency in the locomotive. But as yet the question was a debatable one, and the extent to which it was debatable will be strikingly presented by two acts of great significance, which are made the more remarkable by the fact that George Stephenson had become the Chief Engineer of the Liverpool & Manchester Railroad, then in progress of construction. But it is to be recollected that George Stephenson had not at that time risen to the position as an authority which he subsequently held.

*Anticipation in the United States of the Coming Railroad Era in 1827.*—The reference to what was done and what



HORATIO ALLEN.

power applied to turn the wheels, and thereby haul other carriages carrying loads. In plan and principle the parts and combinations included all that is essential to the locomotive as a tractive motive power.

But the results of the trials made were not of the character to state what was done by Stephenson it is of interest on this side of the Atlantic to refer to what was proposed, tried and proved in relation to the high-pressure engine, and to the locomotive engine as a tractive power on a road by that remarkable man, Oliver Evans, of Pennsylvania.

*The High-Pressure Engine and Locomotive Combination of Oliver Evans, of Pa., U. S., 1776.*—But before proceeding to state what was done by Stephenson it is of interest on this side of the Atlantic to refer to what was proposed, tried and proved in relation to the high-pressure engine, and to the locomotive engine as a tractive power on a road by that remarkable man, Oliver Evans, of Pennsylvania.

As early as 1780, and before Watt had perfected and introduced the condensing engine, Oliver Evans had matured his plan of a high-pressure engine, and had applied it to do work as a stationary engine.

It is of interest to know that the boiler which Oliver



was not done by the Liverpool & Manchester Railroad Company is postponed at this state of questions to be decided, because the action of other parties came in at this time, which in its results is of special interest to this country.

The reference to this action is of necessity personal, and it is to be borne in mind that it is only as matter of history that the successive statements that follow are made.

During the years 1826 and 1827 the use of the locomotive on the Stockton & Darlington road had become known to many and especially to civil engineers in this country, and among others to myself, then a Resident Engineer on the line of the Delaware & Hudson Canal, the great engineering enterprise of the time, the first of the great works, canal and railroad, that were to bring the anthracite coal of the valley of the Susquehanna into the valleys of the Delaware and of the Hudson, and to the ocean.

Such consideration as was within my power led me to a decided conviction as to the future of the locomotive as the tractive motive power on railroads for general freight and passenger transportation, as it had begun to be for mine transportation.

The same judgment as to the locomotive which I hold now I held then. A brief reference to the essential character of THE LOCOMOTIVE AS A TRACTIVE POWER, is not out of place in this reference to its introduction as the motive power on all railroads.

A horse having the power of onward motion in himself, that power is used as a *tractive* power on a railroad, when the horse is by harness and traces connected with a railroad car, and the resistance of the car to onward motion being less than the power of the horse, onward motion takes place. How is it that the locomotive, by its steam-engines and combination with the iron rails, has the power of onward motion, and therewith becomes a *tractive* force?

The reply to this question is not as simple and direct as it is usually considered to be; and as the full truth may be of interest to some readers the following statements are added as pertinent to the subject in hand.

It is readily understood that if a locomotive is blocked up to a position at which the driving-wheels (the wheels on which the steam-engines act) are *not* in contact with the iron rail, and steam is let into the two steam cylinders, the two wheels will have rotary motion, and at great rate if desired.

Such being the result of the operation of the steam-engines under the circumstances, suppose the locomotive to be lowered to the rails, and the weight of a large part of the locomotive, including boiler, engines, etc., rests on the rails through the driving-wheels, and that again steam is let into the cylinders; there being no cars attached to the locomotive, the locomotive at once has *onward motion*.

This onward motion is usually referred to the rotation of the driving-wheels, caused by the *direct* action on them of the two engines.

This is only in part true, and attention is to be directed to the other cause of onward motion.

When the crank-pin on the driving-wheel is on the *upper* half of one rotation, it is forced by the steam power acting on it to make that half rotation, and in consequence of that half rotation the locomotive has a certain onward motion; but when the crank-pin makes the *lower* half of the rotation the steam in the cylinder, acting direct on the cylinder head to cause onward motion, onward motion takes place; and with it, of necessity, the onward motion of the locomotive which carries the cylinder; and the locomotive having onward motion, the wheels that carry the locomotive of necessity have rotary motion.

Thus, as a matter of fact, the onward motion for half of each rotation is caused by that half rotation, and the other half rotation is due to the onward motion of the locomotive.

But a more important question remains to be answered, viz.: How is it that in *either* case onward motion of the locomotive takes place?

The reply is that when steam acts on the combination the motion yielding to its force can take place in one of two ways:

1. The wheels may *slip* on the rails.
2. The locomotive can have onward motion.

To each of these motions there is a resistance.

In the one, the resistance to *slipping* on the rail.

In the other, the resistance of the locomotive and its train to onward motion.

The word "*slip*" inadequately suggests the great resistance to *slipping* that is the case when the surface of the wheel is forced into contact with the surface of the rail by the weight of the boiler, engines, etc., of the locomotive. That weight often exceeds four tons to each wheel, or eight tons to the two wheels. The resistance to the slipping of the wheel under this great pressure is the same as the resistance to movement along the surface of the rail of eight tons of iron lying on the rail.

Experiment had long ago determined that the resistance to the movement of iron resting on iron, the surfaces not lubricated, exceeded one-eighth the pressure on the bearing surface; that is, that one ton, suspended vertically and acting through a pulley to move eight tons horizontally, would be required to move the eight tons along the rail.

The resistance to the onward motion of the locomotive and its train of cars can be expressed with equal definiteness. Such being the relation of the two resistances, it is plain that as long as the resistance to onward motion of the locomotive is less than the resistance of the wheels to slip on the rail the locomotive and its train will have onward motion; but if from any circumstance the resistance to onward motion becomes greater than the resistance of the wheels to slipping, then, of course, the wheels slip and the locomotive stands still—an occurrence which often meets

the eye of the traveler when a train in motion on a level road commences the ascent of a rising grade for which the locomotive is not prepared.

Early in the year 1827 I had given all the attention that it was in my power to give, and having come to conclusions as to the locomotive that all subsequent experience has confirmed, and believing that the future of the civil engineer lay in a great and most attractive degree in the direction of the coming railroad era, I decided to go to the only place where a locomotive was in daily operation and could be studied in all its practical details.

Closing my service on the Delaware & Hudson Canal, some two months were appropriated to certain objects and interests, after which I was again in New York, preparatory to going to England.

*First Order for a Locomotive after the Stephenson Locomotive in 1825, being Three for the Delaware & Hudson Canal Company of New York and Pennsylvania in 1827, and Built in 1828.*—On my return to New York from these visits I found that it had been decided by the Delaware & Hudson Canal Company to intrust to me, first, the having made in England for that company the railroad iron, required for their railroad, on which the coal from their mines in the valley of the Lackawanna, a tributary of the Susquehanna, was to be transported across the mountain range which intervened to the Lackawanna, a tributary of the Delaware, whence by canal the valley of the Hudson was reached, and by the Hudson River the ocean was reached at New York; and, second, the having built in England for the company three locomotives, on plans to be decided by me when in England.

This action of the Delaware & Hudson Canal Company was on the report of their Chief Engineer, John B. Jervis, and thus it occurred that the first order for a locomotive engine, after the locomotives on the Stockton & Darlington road were at work, came from an American company, on the report of an American civil engineer, now a resident at Rome, in the state of New York.

It was under these favorable circumstances that I left New York in January, 1828, and within two days after my arrival at Liverpool I made the acquaintance of George Stephenson, on the most agreeable relations, and from that time during my stay in England I received from him every kindness in his power, and all the aid to what I had come so far to seek, that was at his command, at Liverpool, on the Stockton & Darlington Railroad, and at Newcastle, at that time the centre of all that was in progress in railroad and locomotive matters.

*First Order for Railroad Iron for the United States being for the Delaware & Hudson Canal Company, 1828.*—The iron for the railroad first required attention, and as its manufacture, although executed in England, was on a plan of American origin, some reference to its manufacture is appropriate in this article.

The instructions which accompanied the authority to contract, etc., described a mode of making the iron. On reading the description it appeared to me that a less expensive plan could be used. This I explained to the committee of the Delaware & Hudson Canal Company. It was thought proper to have the judgment of some one having experience in rolling iron, which I had not, as I had not even seen a bar of iron rolled. The proprietor of the only rolling-mill near New York, at the request of the committee, came to New York to consider the plan proposed, and after examination he stated that in his judgment the plan would not be a success. Nevertheless I thought it would be well to suggest the plan at the rolling-mills in England.

This being the first order for iron made expressly for a railroad from this country, it was deemed advisable to go to the mills and explain what was wanted, and to suggest one way in which the iron could be made, as it appeared to me. Of the 17 mills visited, and from which proposals were received, only three thought well of my suggestion.

With one of the three, the Guests, of Merthyr Tydvil, a contract was made. When the time for examination of the iron came it was not satisfactory, and I said that I could not accept iron of that character; they refused to deliver any other.

Application was then made to W. & I. Sparrow, of Wolverhampton, another of the three, and reference to what had occurred at Merthyr Tydvil. I described very plainly what I expected. In reply I was informed that the intention in their proposals was what I had fully explained. The contract was therefore made with W. & I. Sparrow. My wish in this case to remain and see the preparations made being acceded to, the rolls to be fitted up were on hand, and in ten days the iron was being made on the plan proposed and subsequently the iron was delivered in every respect satisfactory. The large amount of iron of the same character made for this country, in after years was all made on that plan. If the mechanical details of the plan were described, there would be surprise that there ever had been any question, or that it had been thought worth the time to refer to it.

*The Boiler of the Locomotives the Great Question of the Locomotive.*—The order for the locomotive required the determination of the plan of boiler, and in order to that decision, and to the study of all matters in connection with the construction and use of railroads, much time was passed at Liverpool in connection with the Liverpool & Manchester Railroad, on the Stockton & Darlington Railroad, at Newcastle and at Stourbridge, the place at which were the works of Foster, Rastrick & Co., from whom proposals to furnish the railroad iron had been received.

As to the boiler, the result on my mind was a decided

confidence in the multitubular boiler proposed by Mr. Booth of the Liverpool & Manchester road, but I found in many a distrust of that plan of boiler as being an *untried* boiler. John U. Rastrick, of Stourbridge, of whose position on all railroad questions a very marked expression will be stated presently, recommended a boiler of small riveted flues of as small diameter as could be riveted, and in number as many as the end of the fire-box would allow.

Under the circumstances it appeared to me that the responsibility resting on me would be more prudently met by the order of two locomotives from Stephenson, which were built at Newcastle, and one from Foster, Rastrick & Co., which was built at Stourbridge.

The plans of the locomotives, the proportions of parts and all details were left to the judgment of the builders, as their experience far exceeded mine.

The only points decided by me were that the boilers of the locomotives built by Stephenson & Co. were to be multitubular boilers, the dimensions of the tubes to be decided by the builders; and that the boiler of the locomotive built by Rastrick & Co. (the "*Stourbridge Lion*") was to be a flue-boiler, the size and number of the flues to be decided by the builder.

As the locomotives were built after I left England they were never seen by me until I saw them in New York, and I never saw the inside of any of the boilers until I saw the inside of the boiler of the "*Stourbridge Lion*," at Chicago, in 1883; when, to a surprise so great that I could not believe that the inside of the boiler had not been changed, I found that the discretionary power placed in Mr. Rastrick had not been used in the manner agreed on after full discussion, and after I had yielded to his judgment in having a flue-boiler at all.

In the orders thus given in the early summer of 1828 for three locomotives is presented the fact that the *first* order for a locomotive after the demonstration of the locomotive as a successful tractive power on the Stockton & Darlington Railroad in 1825, came from an American company on the report of their Chief Engineer, trusted to the discretionary action of an American civil engineer.

The three locomotives were received in New York in the winter of 1828 and 1829.

One of each kind was set up, with the wheels *not* in contact with the ground, and steam being raised, every operation of the locomotive was fully presented except that of onward motion.

The locomotive from Stourbridge received its name "*Stourbridge Lion*" from the fancy of the painter, who, finding on the boiler end a circular surface, slightly convex, of nearly four feet diameter, painted on it the head of a lion, filling the entire area, and in bright colors.

The river and canal being closed by ice it was not until the opening of navigation in the spring of 1829 that access was had to the railroad at Honesdale, Pa., which is at the head of the canal and at the beginning of the railroad.

Returning to New York during the winter of 1828 and 1829, I refer to a brief connection with the Delaware & Hudson Canal Company, to present in striking contrast the financial resources of that time and the present. The Delaware & Hudson Canal railroad and mining development had been brought so near to completion and productive use by the expenditure of the stockholders' capital that only \$300,000 were required to bring into operation this great enterprise of delivering anthracite coal on the waters of the Hudson River, and by that river at tide-water at New York.

But so limited were the financial resources of the time that it was found necessary to apply to the Legislature of the state of New York for the loan of the credit of the state to raise \$300,000. In this application it was found necessary to meet the representations, afterward found to be gross misrepresentations, of those who took great pains to prevent any appropriation of money, private or public, to an enterprise so full of uncertainty. The representation made it necessary to prove that the coal transported would *burn*. Under these circumstances I was invited to pass a few weeks at Albany, to be of such use as might be.

When the time came that one of the locomotives was to be sent by river and canal to Honesdale the "*Stourbridge Lion*" was sent.

How it happened that the "*Stourbridge Lion*" was sent I have no knowledge.

In reference to future events, so near by, it is to be regretted that one of the Stephenson locomotives was not sent and for the reason that the locomotives built for the Delaware & Hudson Canal Company by Stephenson were the *prototypes* of the locomotive "*Rocket*," whose performance in October of the same year so astonished the world.

The two locomotives from Stephenson that were in New York early in the year 1829, and therefore prior to the trial of the locomotive "*Rocket*," in October of that year, were identical in boiler, engines, plan and appurtenances with the "*Rocket*;" and if one of the two engines in hand ready to be sent had been the one used on Aug. 9 the performance of the "*Rocket*" in England would have been anticipated in this country.

(TO BE CONTINUED.)

#### Standard Time.

Mr. W. F. Allen, Secretary of the General Time Convention and editor of the *Official Guide*, says: "The adoption of the standard time system by most of the railroads has led to its general acceptance throughout the country. I have just received replies to a circular sent to the companies inquiring to what extent standard time has superseded local time. Out of 153 roads 108 report that the towns along their routes are using standard time. Seventy-eight out of 100 of the principal cities named in the census of 1880, but exclusive of the cities of the Pacific Coast, have adopted



standard as their official time. The Union Pacific Railroad will adopt the new time on its Union Division when it makes up its spring schedule, and the Central Pacific will probably follow it. This will doubtless bring the whole Pacific Coast into the system. Most of the cities east of the Pacific Coast that still retain local time are in Ohio—they are six in number. Excepting Pennsylvania, where three cities to hold the old system, there are not more than two cities in any other state where local time is used. The official time of the District of Columbia is now based on the 75th meridian, the bill authorizing the change having been approved by the President on March 13."

#### Roberts' Woven-Wire Car Seat.

We illustrate a form of this seat in which additional elasticity is given to the wire fabric by means of vertical spiral springs. This form of seat appears to possess the advantages of cleanliness and durability, and requires but a slight covering, so that but little dust can accumulate. The seat is composed of a series of woven-wire coils, forming an elastic wire fabric. As the elasticity and softness is obtained in the seat itself little upholstery is required, the woven-wire fabric taking the place of the usual canvas on which the upholstering material rests. This wire fabric, forming an open base or support for the seat, bears the weight of the person occupying it; and, as the base of seat is open, all dust falls through the bottom of the seat to the floor of the car, where it is swept up. No dust remains in the seat. Only about three-fourths of a pound of hair or other material is required to cover this seat, and if thought desirable it can be used uncovered.

The wire fabric may be adjusted to any tension desired, by a device for this purpose, making a very rigid or soft seat. This seat has a spring edge, and is elastic even to the very edge of the seat. Woven-wire work on a similar principle is now much used in berth bottoms on large ocean steamers, and its cleanliness and absence from smells makes it preferable to mattresses, especially in hot weather.

The form of seat we illustrate is used on the Michigan Central, the New York, Ontario & Western, and the Chicago, Milwaukee & St. Paul, and other lines. The seat backs can of course be made in a similar manner. Further information may be obtained of the patentee, Mr. Henry Roberts, Hartford, Conn.

#### Contributions.

##### The Joy Valve-Gear on the Great Eastern Railway.

NEW YORK, April 2, 1884.

TO THE EDITOR OF THE RAILROAD GAZETTE:

An article published in the RAILROAD GAZETTE, Feb. 22, page 151, headed "American Master Mechanics in England," makes it appear that Mr. T. W. Worsdell, formerly of the Pennsylvania Railroad (Altoona), but now of the Great Eastern Railway, England, after experience with the Joy valve-gear on express engines had reverted back to the link motion for more recent freight engines.

I have ascertained from him that he is now completing ten freight engines with the link motion, which engines have been in abeyance and partly constructed prior to the time when the Joy gear was "exploited" on that road.

Mr. Worsdell says he "wishes the ten freight engines had been like the expresses, same size cylinders and Joy gear, and that his next freight engines will have larger cylinders than the expresses referred to and the Joy gear."

Since the development of the Joy valve-gear on the Great Eastern Railway no locomotives built, building or projected for that road have anything but the Joy gear.

WAYLAND TURNER.

#### "The Gravest Defect in Maintenance of Way."

Pennsylvania Railroad Co.,

New York Dir.

NEW BRUNSWICK, N. J., March 31, 1884.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am very glad you have taken up the subject of the importance of "level track" under the head of "The Gravest Defect in Maintenance of Way" in your issue of the 28th inst. I perfectly agree with you as to the importance of the constant use of the spirit level on straight track, as well as on curves in giving the proper elevation, without which in my judgment it is impossible to "put up" perfect riding track.

I have been surprised to find how little value is placed upon the use of the spirit level in putting up track by old and experienced trackmen. In almost every case I have found that they surface each rail of the track separately; entirely disregarding the use of the level, except on curves.

My attention was first awakened to the fact that something was wrong by the oscillation of the cars on riding over the road at a high rate of speed over track which I knew to be in perfect line and surface. Upon examination on the ground with level board and gauge I found what was apparently a perfect piece of track to be out of level from  $\frac{1}{8}$  to  $1\frac{1}{2}$  inches for almost the entire length of the different sub-divisions; the gauge varying from  $\frac{1}{8}$  to  $\frac{1}{2}$  inch wide in the same manner.

In this connection I beg leave to state that next in importance to level track, in my judgment, is correctly gauged track. Upon issuing positive instructions for the constant use of the spirit level and gauge, the most satisfactory results were obtained, and the oscillation of the cars referred to greatly diminished.

A glass of water a little over three-quarters full, placed on the window sill of the rear of the last car is the test I have always used to determine conditions of track, which in my judgment is simpler than the one described in your article, and at the same time more sensitive. By closely observing the motion of the liquid you can quite accurately

detect the irregularities in the level of the track, as well as the slightest imperfections in the surface, joints, etc.

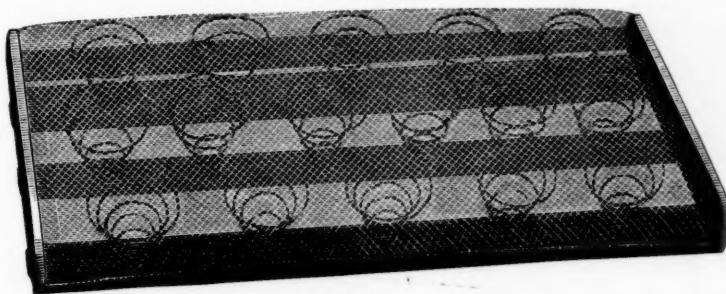
VICTOR WIEMAN, Supervisor.

[We have commented on this letter in another column. We will only say here that the use of a glass of water, which our correspondent suggests as a test of the condition of track, while it may be excellent as a test for general inspection, will not answer at all (at least we think not) for the particular purpose we suggested. The glass of water reveals too much. We proposed that one should simply lean against the side of the car and observe depressions only on the opposite side of the car only, paying no attention for the time being to any other defects or even to the same defect in the other rail. In this way the mind can clearly and easily perceive that every dip is followed after an interval by a sharp blow against the rail. It will be found that if the least attention is paid to any other

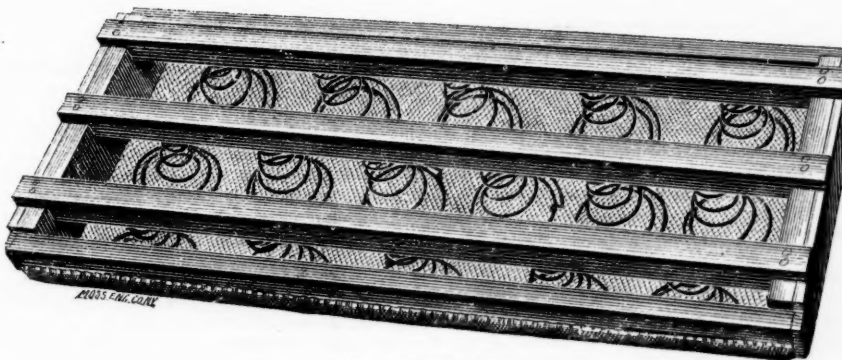
instrument. These experiments do not refer to secondary strains.

The strains arising from rigid connections in many instances are, however, very considerable indeed. Even plate girders of the best design and manufacture cannot possibly yield the exact full strength calculated from the theory of flexure of solid beams of simple cross-section, for their parts are not connected atom by atom, but only at certain distances by more or less imperfect rivets or bolts. The real strength of experimental plate girders consequently varies between 95 and less than 50 per cent. of their calculated strength, according to design and manufacture. The same range of variations at least must be expected with regard to open trusses or girders.

More especially as regards riveted open girders there must be a limit beyond which—though it might still be possible, according to elementary calculation—it will not be safe to go. There must exist a certain relation between the size of practically possible rivets or their number and the area of the members connected thereby. This limit must



Top View.



View of Underside.

ROBERTS' WOVEN-WIRE CAR SEAT.

defect, or even to the same defect in both rails at once, the effect of the experiment is spoiled.

Perhaps, however, Mr. Wieman means that the test of a glass of water would be an effectual substitute for a level attached to a hand-car which we suggested. This, indeed, is almost a necessary inference from his statement that it is a "simpler test than the one described" in our article. If so, he has failed to catch our point, and for this reason we have commented further on his letter in another column. What is needed is something for the use of the section-men and not the supervisor.

We would again note as to an efficient hand-car level, that it would probably require some little experiment to get just the right kind for the purpose and duly protect it. We can perceive no other remedy, however, for the evil to be cured.—EDITOR RAILROAD GAZETTE.]

#### Secondary Strains of Statical Structures.

[By some neglect the author's corrections of the article below did not reach the printer until after its publication last week, and the errors were so numerous, and some of them so serious, that they are best corrected by republication.—EDITOR.]

#### I.

The strains in statical structures which are caused by the rigidity of the joints are termed "secondary strains." They are the result of flexures, are changeable from point to point, and it is not very easy to study their values by experiments. Indeed, the only instrument which might answer this purpose, if not too sensitive, is that invented by C. E. Stromeyer; but, so far as the writer knows, it has not yet been tried for this purpose. This instrument is known to be constructed on the principle of Newton's rings. Its base line for measurement is only about 3 in. long.

Engineers are in possession of experiments on the strength of plate girders, but there are no experimental results regarding the breaking strength of open trusses or of riveted lattice girders. There are, so far as the writer knows, only experiments on the primary strains of the Rhine bridge at Arnheim, and the Waal bridge at Nymwegen, made by Dutch engineers with the apparatus of Ch. Manet, of Paris; and others by Professor Fraenkel with his own measuring

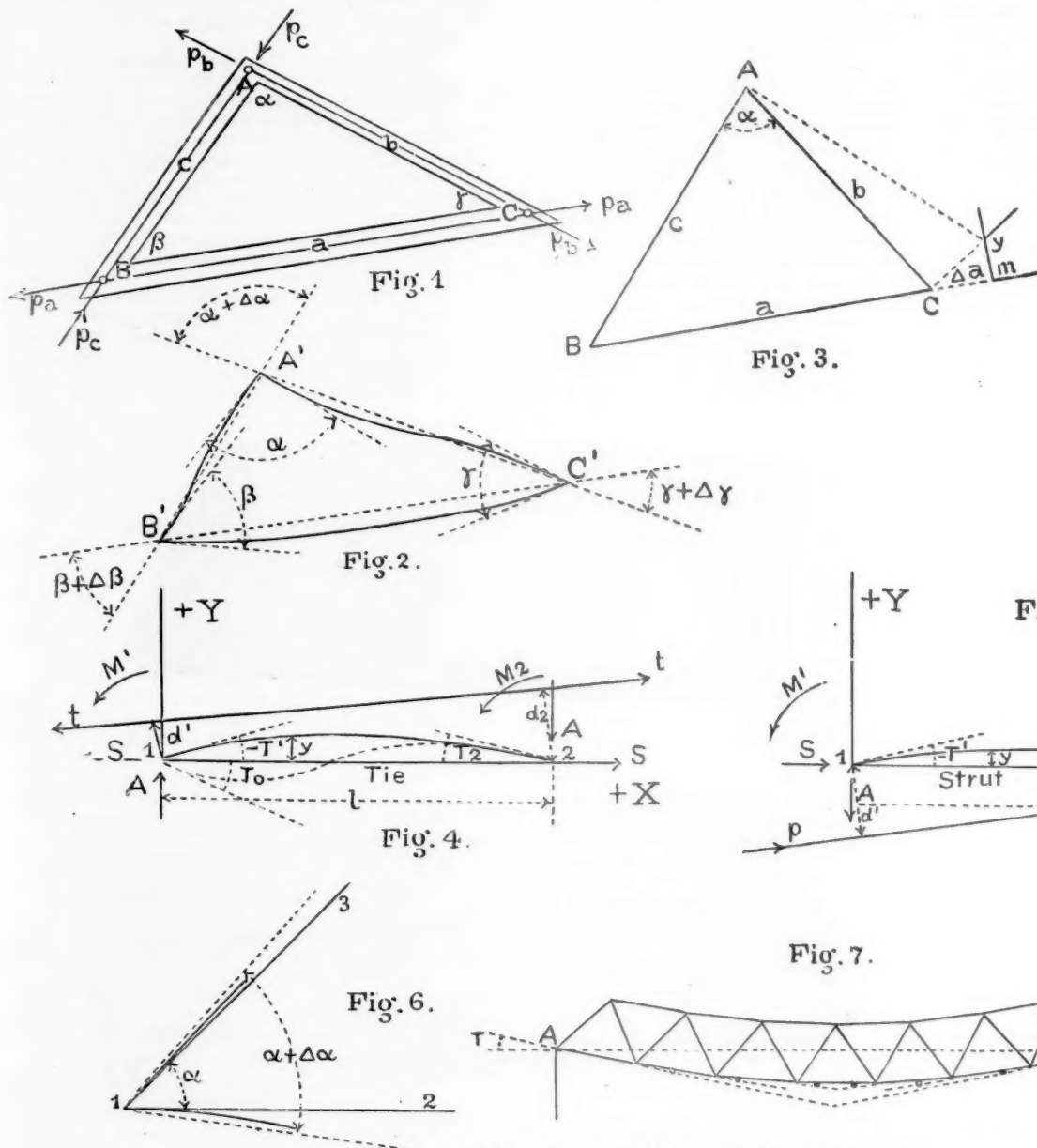
exist just as there is a limiting proportion between the area of the angles and the area and the number of the flange plates of a plate girder. About eight years ago American engineers may have seen a street bridge in progress of construction over four railroad tracks. It consisted of plate girders, with webs 24 in. x  $\frac{1}{2}$  in. The angles were 3 x 3 x  $\frac{1}{2}$  in., and the flange plates in the centre of each girder formed packages of 12 in. x  $\frac{1}{2}$  in. plates 3 in. thick. Hence web joint-angles and two chords had the areas 9 in., 9 in. and 72 in. The rivets were spaced at 6 in. The result might have been predicted. Before the pavement was laid on the buckle plates of this bridge the girders deflected so alarmingly that props were resorted to.

The interior strains demand the most careful consideration of engineers who intend to apply rules good enough for medium spans to spans which are several times as great as any yet executed. In the absence of actual experience, in the absence also of experimental results, the only recourse left to engineers who wish to learn something about these important secondary strains, is to analytical examination.

This mathematical examination necessarily is an intricate one. It may not be to the taste of many executive engineers, who are known to be suspicious of theoretical investigations; but it has at least the valuable advantage that it can be thoroughly scrutinized and criticized, and that it is not necessary to accept it on mere authority, as happens with so many alleged experimental facts, which are absorbed without hesitation, and which are reiterated and accepted as dogmas until overthrown by newer contradictory results. The method of calculating the secondary strains of open girders to be explained here can well bear close scrutiny, and it forms a very essential progressive step in the art of designing statical structures. Engineers are indebted to Herr H. Manderla for the solution of the problem. It was submitted in the year 1878 as an essay in response to a private question by the Munich Polytechnic School. The original may be studied in the *Allgemeine Bauzeitung* of Vienna of the year 1880.

Here it is only intended to explain the method in as popular a manner as possible, to interpret the formulae with a view to American practice, to illustrate the method by an example, to give the results of calculations of European examples, and to draw final conclusions. At the end of this paper the principal formulae will be given, which those conversant with the theory of elasticity may work out for themselves.

According to the common mode of calculation of strains,



SECONDARY STRAINS ON STATICAL STRUCTURES.

perfect hinges are supposed at all joints. The deformed girders accordingly should be frames composed of straight lines. But in reality (see Figs 8 and 11) the ties and struts are curved. It is these curves which are to be determined. The solution, if perfect, should contain the modulus of elasticity of each member. These moduli of finished members may vary considerably, so that it would be necessary to have all members tested before being put into the structure. The method of Manderla permits of introducing the modulus of each separate member. For the purpose of arriving at principles, it is sufficient to suppose a uniform modulus  $E$ . The greater the modulus of the material, the stiffer is the beam; but, as riveted members are known to have moduli which, as a rule, are smaller than those of the bars of which they are composed, the supposition of a uniform modulus will give strains a little greater than the real strains.

The error will be on the safe side, for it is the strength of the compression members which is mostly influenced by the flexures at the joints.

Let there be considered one rigid triangle taken from a truss or a riveted girder (fig. 1). In the straight centre or gravity line of each side there act two equal opposite forces, one pair at least meaning tension. The action of these forces  $p_a, p_b, p_c$  will be:

1. To lengthen (or shorten) the sides  $a, b, c$ , by certain differences  $\Delta a, \Delta b, \Delta c$ , and if  $S_a, S_b, S_c$  are the longitudinal strains per square inch, which produce the differences,

$$\frac{\Delta a}{a} = \frac{S_a}{E}, \quad \frac{\Delta b}{b} = \frac{S_b}{E}, \quad \frac{\Delta c}{c} = \frac{S_c}{E}$$

2. To bend the members into the curves of  $A'B'C'$  of fig. 2 in such a manner that the angles formed by the tangents at the three points retain the same values  $\alpha, \beta, \gamma$  of the original triangle. The straight line  $A'B' = c + \Delta c$ ,  $A'C' = b + \Delta b$ , and  $B'C' = a + \Delta a$ .

3. To cause parts of the forces  $p_a, p_b, p_c$ , to be absorbed by the flexures. If, nevertheless, the  $\Delta a, \Delta b, \Delta c$  are calculated as if they were caused by the original forces, they will be a little too great, and the deformed angles  $B'A'C'$ ,  $A'B'C'$ ,  $B'C'A'$  will differ a little more from the original angles  $\alpha, \beta, \gamma$ , than is the case in reality. This error is on the safe side, though there is nothing to hinder the exact calculation. The difference amounts only to a small percentage of the forces  $p$ , for only a minute proportion of the primary strains produce secondary moments of flexure which

sometimes cause strains over 150 per cent. greater than the primary ones.

A truss is composed of a number of triangles which are connected together, and the rigidity of these connections causes further deformations or flexures.

The phenomenon explained on triangle  $ABC$  holds equally good if the members are connected by pins, unless the secondary flexures become so powerful as to overcome the moments of pin friction. Trusses should be designed in such a manner that real rotations about the pins only happen as regards the permanent load. A bridge being erected, the false-works being removed, and the pins still lubricated, the vibrations caused by passing trains are supposed to bring about a small movement by which the secondary strains arising from the permanent load are done away with.

Riveted structures may also settle down to a condition in which the secondary strains caused by permanent loads are reduced.

Since the primary strains are known it is easy to calculate the alterations of the lengths of the members. Thereupon the changes of the values of the angles are ascertained.

If, for instance, the change of  $\alpha$  as arising from the difference of side  $a$  were to be found, it could be ascertained by the following method. (See fig. 3.) Make  $Cm = \Delta a$  according to any scale, erect perpendicular lines  $my$  and  $Cy$  upon side  $a$  respectively upon  $b$ , and measure  $Cy$  on the same scale. The quotient  $Cy$ , divided by the length of  $b$ , is equal to  $\Delta \alpha$  so far as the alteration due to  $\Delta a$  is concerned. In a similar manner the alterations of the lengths  $b$  and  $c$  can be treated. But it is more expeditious to use formula 4 at the end of the paper. After the changes  $\Delta a, \Delta b, \Delta c$  of a triangle are calculated their correctness is checked by adding them together. Their sum must be nothing, for the angles of a triangle cannot be more or less than 180 degrees. At each joint-point the sum of the changes of the angles is found, which will be positive quantities at the end joints and top-chord joints, but negative quantities at the bottom-chord joints of an ordinary truss. The positive alterations must equal the negative ones. This is another check. Either set of alterations may be used to draw the curve of deflections of a truss. And the method of doing this, as used by H. Mauderla, is exactly the same as the one developed by the writer in a little book on continuous girders, published by Van Nostrand in 1876.

The essential novelty of the new method consists in the

following consideration: Let 1-2 of fig. 4 be a tie, or in fig. 5 let it be a strut of a structure. Suppose the primary forces  $t$ ,  $t$  (or  $p, p$ ) to pass through the central joint-points, while the members 1, 2 do not always pass through these points. But even if 1-2 did pass through these central joint-points, there would be already moments  $M_1, M_2$ , at the end points 1 and 2. If the forces  $t$ ,  $t$  (or  $p, p$ ) act eccentrically, there will be additional moments,  $t d_1$ , and  $t d_2$ .

The force  $t$  (or  $p$ ) can be placed by a horizontal component  $S$  and a vertical component  $A$ , so that in point 1 there act  $S, A$  and  $M$ , and in point 2 there act the forces  $S, A$  and  $M$ . Besides, there are the moments arising from the eccentricities  $d_1$  and  $d_2$ .

If the moment of flexure is acting as indicated by the arrow at 1, the curvature of the member 1-2 near 1 will be convex to the positive side of the ordinates  $y$ ; such a moment is considered a negative quantity; it produces tension in the top fibres of the member. If the moment, on the contrary, is of such a nature as to cause a curvature concave to the positive side of the ordinates  $y$ , it is considered as a positive quantity; it causes compression in the upper fibres, and it has the tendency to produce a rotation in the direction of the movement of the hand of a watch.

If the elastic curve has the form of the dotted line in fig. 4, there will be a positive moment near point 1, and if the figure is turned upside down so that point 2 is to the left, the moment at 2 also appears as a positive quantity. Correspondingly  $T_0$  and  $T_2$  are considered as positive angles, while  $T_1$  would be a negative angle, for it goes with a negative moment.

On the member 1-2 there act: moments  $M_1$  and  $t_0 d_1$ , forces  $S$  and  $A$ ; both together make  $\sqrt{S^2 + A^2}$ .

The levers  $d$  will now be considered as reduced to nil, such as would be the case in a well-designed structure. If  $M_1, S, A$ , also  $E$  and the moment of inertia  $I$  of the member were given, there would be no difficulty in drawing the elastic curve. And supposing them to be known, at least an equation can be formed in which  $M_1, S$  and  $A$  appear, and which expresses the law of that curve. It must pass through the given points 1 and 2. This equation being constructed, the tangential angles  $T_1$  and  $T_2$  can be expressed. This gives two equations, each containing the quantities  $T_1$  or  $T_2, M_1, S$  and  $A$ . From these two equations  $A$  can be eliminated. The equation which remains contains  $S$ , but  $S$  can be considered equal to the primary strain of the member, and there is

$$M_1 = K T_1 + L T_2.$$



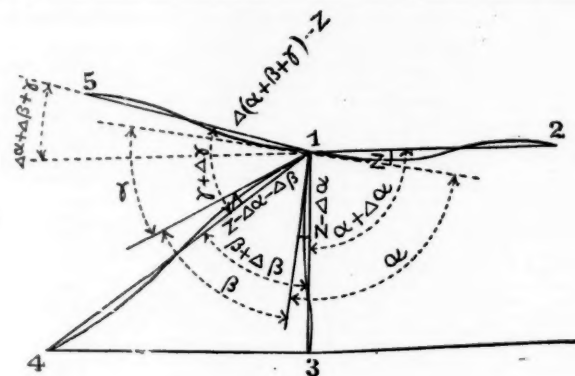


Fig. 8.

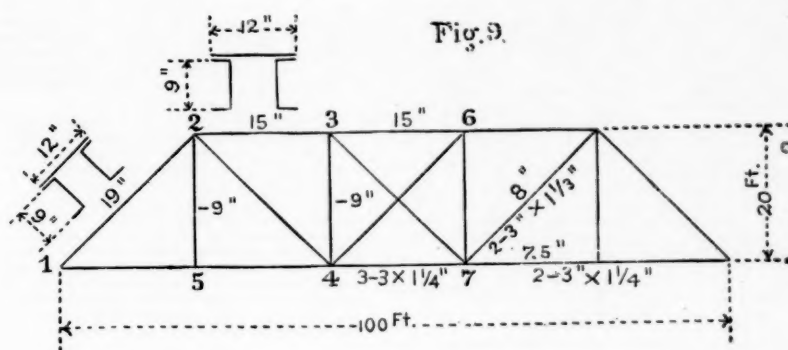


Fig. 9.

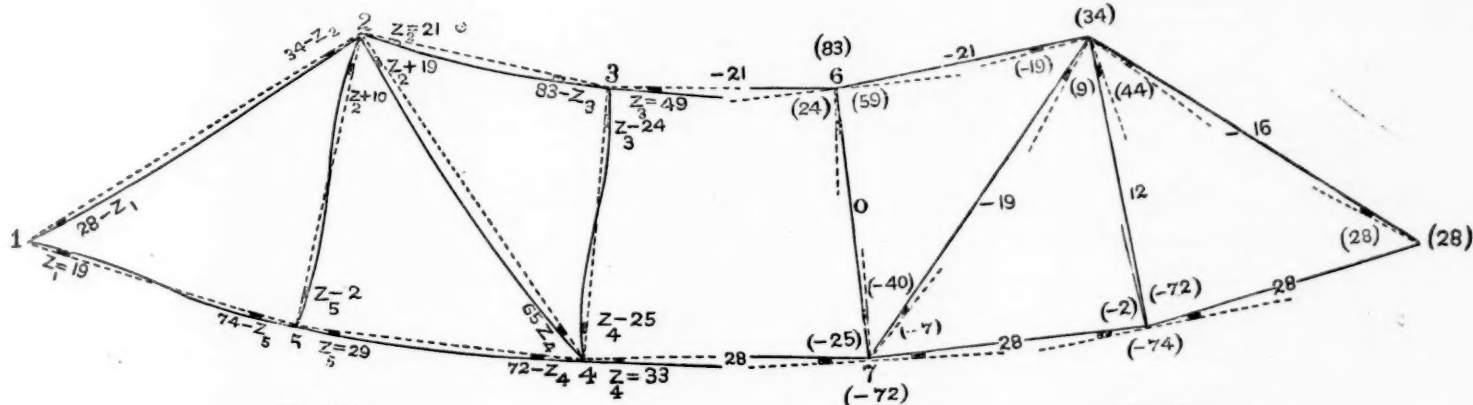


Fig. 11.

Fig. 10.

## SECONDARY STRAINS ON STATICAL STRUCTURES.

The coefficients  $K$  and  $L$  contain the known quantities  $E$ ,  $S$ , and the length  $l$  of the member. There is a separate set of  $K$  and  $L$ , according as the member is a tie or a strut.

It may be seen from the values for  $K$  and  $L$  at the end of the paper that they are proportional to  $\frac{EI}{l}$ ; or, since  $E$  is assumed to be a constant quantity,  $K$  and  $L$  are proportional to  $\frac{I}{l}$ .

Besides, formula (1) shows that  $K$  and  $L$  are moments of flexure, for  $T_1$  and  $T_2$  are very small numerical fractions. Indeed,  $l$  being an expression of four dimensions, and being divided by  $l$ , represents three dimensions. Of these

three take two, forming a surface, and multiply this surface by  $E$ , which is a weight per square unit, and a force is obtained of the same nature as  $l$  (or  $p$ ). This force multiplied by the remaining third dimension gives a moment.

The results obtained may be interpreted, and important conclusions may be drawn.

If in a point, for instance the end point, of a truss two members are connected, one will be acted upon by the moment  $M_1$ , and the other by the resisting moment negative  $M_1$ .

If the angle  $\alpha$  is increased by  $\Delta\alpha$  (see fig. 6), the curves of the members 1-2 and 1-3 at 1 must still preserve the angle  $\alpha$ . If (1) is weaker as to flexure than 1-3, it will contribute most toward making up the difference of  $\alpha$ . For equation (1) teaches that if  $K$  and  $L$  are small (flexible member),  $T_1$  and  $T_2$  must be great to produce  $M$ . Hence the greater the number of those members of a truss which are flexible, or which have small moments of inertia, the greater will be their angles  $T$ ; the less, consequently, will be angles  $T$  of the stiff members of the truss, which cannot bear great curvature without great strains. These rigid members are those which, to be safe against crippling, must be kept as straight as possible; their angles  $T$  must be kept small.

The flexible tension members will be their protectors. Hence the practice of designing tensional members as narrow eye-bars is favorable to the reduction of secondary strains in the very stiffly designed compression members of the same structure.

Secondly, it is good practice to use long panels. For the longer the panels the greater the lengths  $l$  of the members, and consequently the smaller  $K$  and  $L$  will become.

The writer always advocated long panels, and he has used them, 11 years ago, nearly 20 ft. long in spans of 100 ft. length, and 12 years ago, 19 ft. long in a span of 152 ft. At that time the advantages of long panels were so little understood that at a bridge-letting a "bridge expert" denounced the writer's plan because it had "no panels." At another letting a good design was simply ignored and shelved for the same reason, though the proposal was commercially the most favorable among a very great number of others. The design yielding the greatest percentage of secondary strains received the award.

Thirdly, the less the deflections of a truss, other things

being equal, the smaller will be the sums of alterations of angles at each joint-point. This sum of alterations of angles at each joint-point is made up by the angles of flexure  $T$  of the members meeting at this point. The less the sum, the less will also be the share of each member in making it up. In other words, the less will be the moments  $M$  and the corresponding secondary strains. It is, therefore, good practice to build trusses as deep as possible. As regards great depths, American practice for a time was ahead of the most economical design on the Continent.\* In regard to careful design of lateral bracing and attachment of floors, the best Continental examples are still in advance. Great lateral stiffness is not independent of great vertical stiffness, and conversely. Great depth of a bridge can be used if it is made sufficiently wide, if the lateral and oblique bracing is carefully calculated and carefully proportioned, and if the wind braces pass as exactly through the true joint-points as do the other members of the bridge.

The tangential angles of deflection at the ends  $A$  and  $B$  of a truss (see fig. 7) are equal to each other if the truss is of symmetrical form and is symmetrically loaded. These two angles together are equal to the sum of alterations of the total joint angles at one of the chords. The greater the angle  $T$ , the more the truss will suffer from secondary flexures. But the distribution of these angles over the different joints, especially the top joints of an ordinary truss, in each of which (except at the ends) there meet three stiff compression members and only one tensional member, is an important element. If in a pair of corresponding top-chord joints a sudden or considerable increase of the sum of the angles takes place, these are the points where great extra strains must be expected. In girders with vertical posts and parallel chords this happens near the centres of the top chords. The alterations of the joint angles of a fully loaded parabolic bow-string girder are very uniform, which is favorable to more equally distributed secondary strains, but this advantage is lost again on account of the smaller average height.

CHARLES B. BENDER.

## APPENDIX.

For tension (see fig. 4) there is the equation:

$$EI \frac{d^2y}{dx^2} = Ax + Sy - M_1,$$

which integrated gives:

$$EIy = ae^{tx} + be^{-tx} - \frac{Ax}{t^2} + \frac{M_1}{t^2}$$

where  $e$  is the number 2.71828.

For  $x = 0$  there is  $y = 0$ , for  $x = l$  there is  $y = 0$ , so that  $a$  and  $b$  are fixed.

For compression (see fig. 5) there is the equation:

$$EI \frac{d^2y}{dx^2} = -Ax - Sy - M_1,$$

which integrated gives:

$$EIy = a' \sin. \alpha x + b' \cos. \alpha x + \frac{Ax}{t^2} + \frac{M_1}{t^2}$$

\* Depths of one-sixth of the span for bridges over 300 ft. long and panels of 18 ft. length are quite the rule now in Germany and Holland.

For  $x = 0$  there is  $y = 0$ , for  $x = l$  there is  $y = 0$ , so that  $a'$  and  $b'$  are fixed.

Each of the equations is now treated as follows:

Differentiate once and remember that for

$x = 0$  there is  $\frac{dy}{dx} = T_1$ , and for  $x = l$  there is  $\frac{dy}{dx} = T_2$ .

Eliminate between the two equations so gained the value  $A$  and the result is equation:

$$\frac{M_1}{M_2} = \frac{KT_1 + LT_2}{KT_2 + LT_1} \quad (1)$$

The values of  $K$  and  $L$  are, for tension members:

$$K = \frac{EI}{l} \left( 4 + \frac{2}{15} \zeta^2 - \frac{11}{6,300} \zeta^4 \dots \right) \quad (2)$$

$$L = \frac{EI}{l} \left( 2 - \frac{1}{30} \zeta^2 + \frac{13}{12,600} \zeta^4 \dots \right)$$

For compression members:

$$K = \frac{EI}{l} \left( 4 - \frac{2}{15} \zeta^2 - \frac{11}{6,300} \zeta^4 \dots \right) \quad (3)$$

$$L = \frac{EI}{l} \left( 2 + \frac{1}{30} \zeta^2 + \frac{13}{12,600} \zeta^4 \dots \right)$$

and there is  $t^2 = \frac{S}{EI}$  and  $\zeta = tl = \sqrt{\frac{Sl^2}{EI}}$

If a triangle has the sides  $a$ ,  $b$ ,  $c$ , with the angles  $\alpha$ ,  $\beta$ ,  $\gamma$ , opposite to these sides, and if these sides increase by  $\Delta a$ ,  $\Delta b$ ,  $\Delta c$ , which are very small quantities, from the well-known equation:

$$a^2 = b^2 + c^2 - 2bc \cos. \alpha$$

by differentiation and an easy transformation the formula is prepared:

$$\Delta \alpha = \cotang. \beta \left( \frac{\Delta a}{a} - \frac{\Delta c}{c} \right) + \cotang. \gamma \left( \frac{\Delta a}{a} - \frac{\Delta b}{b} \right) \quad (4)$$

in which the differences must be introduced as negative quantities if they are due to compression. Manderla's theory of calculating the secondary strains must be used only where the primary strains calculated are already very near the true strains. If, for instance, a two-panel truss with a deep continuous beam as top chord is to be investigated, it will be necessary to treat this truss as a combination of the continuous beam with a yielding middle support. Thereupon the moment of flexure at the middle point of the beam is found, and then only Manderla's formulæ can be employed.

## An Electric Head Light.

An electric head light, the invention of Mr. Woolley, of Indianapolis, has been tried on the Chicago, St. Louis & Pittsburgh Railroad. It was placed on engine No. 460, which has made several trips, and the result of the test is said to have been very satisfactory. A report says that its reflection is so powerful that a person riding on the engine can see a distance of 23 telegraph poles in advance of the engine, and any object upon the track can be observed in time to stop a train running at the rate of 45 miles per hour before striking it. It is run by a little engine and dynamo placed on the side of the locomotive back of the Westinghouse air brake. The engine is, of course, in constant motion, and fed direct from the boiler



by an eighth of an inch tap. Its reliability has been the chief anxiety of the inventor. Some weeks ago a method to overcome the effects of the oscillating motion of the locomotive was hit upon, yet there were minor difficulties to overcome which only experimenting would bring out; hence on two or three of the early trial trips the light went out. It has now run 5,400 miles, and performed admirably, not once going out. It is claimed for the electric light that it penetrates through a heavy fog so strongly that an engineer, if any obstacle is on the track or anything wrong, has ample time to bring his train to a standstill. The first cost of the light exceeds that of the ordinary head-light, but the inventor claims that after being once placed on a locomotive it costs little more to produce light, as the productive power is furnished by a small amount of steam. The inventor states that, while the light is practically perfect, there are minor improvements to be made, which will not only increase its power, but make it as reliable as an ordinary head-light in every respect.

#### Wolfrath's Combination Sash-Lift and Automatic Fastener.

We illustrate an improved method of securing car window sashes, fig. 1 showing the fastening which secures the sash to the window casing, and fig. 2 the finger-piece or lift by which the sash is moved. The sash stops in any position the

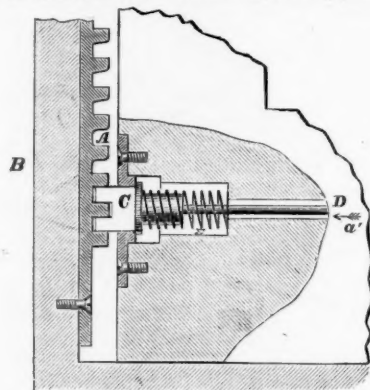


FIG. 1.

#### WOLFRATH'S COMBINATION SASH-LIFT AND AUTOMATIC FASTENER.

moment the hand releases the lift. The rack, A, is secured to the window-casing, B, in such a manner that a bolt projecting from the side edge of the sash can engage with the rack for the purpose of locking the sash in the desired position. The bolt C is attached to a rod, D, extending longitudinally through the middle of the bottom rail of the sash to the lift shown in fig. 2, where it is connected at the back of plate H with and operated by plate M, this plate M being adapted to be pressed into a recess formed in the bottom of the finger-plate N projecting from the front of the plate H. The plates H and N can be made of any suitable design, and have the appearance and occupy the position of an ordinary sash-lift, such as is usually employed on car windows. On the plates H, M and N can be seen, which is an advantage in revarnishing or painting.

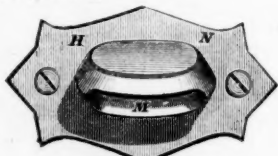


FIG. 2.

The inventor, Mr. Wm. H. Wolfrath, is foreman of the car yards at the Grand Central Depot, New York, and he has long felt the need of some contrivance by which the window may be raised easily from the centre, not, as now, by holding back the bolt with one hand while the other is tugging at the lift. The window may be raised to any desired point from one inch to the extreme height, and cannot fall, and cannot be pulled down without continuous pressure on the lift. This does away with the breakage of glass which is now suffered by railroad companies by reason of the trainmen and passengers pulling back the catch and letting the windows fall. These sash-lifts are manufactured by the New York Car Fittings Co., No. 82 Drexel Building, New York.

#### The Smith Locomotive Truck Patent.

In the case of the Pennsylvania Railroad Co., appellant, against the Locomotive Engine Safety Truck Co., appellee, the United States Supreme Court has decided letters patent No. 34,377, originally granted to Alba F. Smith, Feb. 11, 1862, for improvements in trucks for locomotives, to be void in law. We are indebted to Mr. Andrew McCallum, of the Eastern Railroad Association, for a copy of the decision.

The patent in question was assigned to the Locomotive Engine Safety Truck Co., and formed the basis of the claim for the use of what is generally known as the swing truck, upon which large sums of money have been collected as royalty. The Executive Committee of the Eastern Railroad Association decided, on the opinion of the late Judge Curtis, that this was not a patentable invention, the truck being substantially the same as had been previously used under passenger cars, and advised the members of the Association that any claim for infringement should be resisted.

The company obtained a judgment in favor of the Erie Railroad Co. (not a member of the Association) and in 1873 began a number of suits against railroad companies. The suit in question was brought against the Pennsylvania Railroad Co., and in the Circuit Court a judgment was obtained against that company, with damages amounting to \$82,644. An appeal was thereupon taken to the Supreme Court, which now reverses the decision of the lower court. This decision will control the other suits pending under the same patent.

In its opinion the Court lays down the general principle that the application of an old process or machine to a similar or analogous subject will not sustain a patent, even if the new form of result had not before been contemplated. It also holds that the truck in use under cars before the patent in question was granted was substantially the same, and that the patent being merely for the application of this form of truck to a locomotive was void for want of novelty.

After noting the specifications of the patent and quoting other cases in point, the Court says:

"The invention, then, as claimed, is for the combination, with a locomotive engine, of a truck, of which the king-bolt, forming the connection to hold the truck to the engine, passes through a bolster and through an elongated opening in the plate or platform of the truck, so as to allow the truck to have a lateral motion beneath the bolster; and the bolster takes the weight of the engine in the middle, and is suspended from the frame of the truck by pendent and slightly divergent links, so that any movement of the engine or truck sideways, as in entering upon or passing over a curve of the track, causes the links on the side toward which the engine moves to assume a more inclined position, and the other links to become nearly vertical, and the weight of the engine, hanging upon the links, checks its own lateral movement, and tends to bring both sets of links back to their original angle.

"In railroad cars the trucks were allowed to swivel around the king-bolt before 1841; the transverse slot and pendent links, allowing a lateral motion, were used by Davenport & Bridges in 1841; in 1859 Kippel & Bullock made the pendent links divergent; and at the time of Smith's invention the trucks of railroad cars had all the elements of the truck put by him under the front of a locomotive engine.

"The question, therefore, is whether employing, as the forward truck of a locomotive engine with fixed driving wheels, a truck already in use on railroad cars, has the novelty requisite to sustain a patent.

"After carefully considering the evidence and arguments in this case, and the reasons assigned for sustaining Smith's patent, in the opinion of the court below, reported in 1 Banning & Arden, 470, and in the opinion rendered by the Circuit Court in the Second Circuit in *Locomotive Engine Safety Truck Co. vs. Erie Railway Co.*, reported in 6 Fisher Pat. Case, 187, and in 10 Blatchford, 292, this Court finds itself unable to escape from the conclusion that the application of the old truck to the locomotive engine neither is a new use, nor does it produce a new result.

"In both engine and car the increased friction against the rails and the danger of being thrown off the track in entering upon or passing along a curve are due to the impulse of forward motion in a direction tangential to the curve, and to the influence of centrifugal force. In the engine, as in the car, the object and the effect of the transverse slot, allowing a slight lateral motion, and of the divergent pendent links, by means of which the weight of the engine or car itself helps to keep it upon the track, and to secure steadiness and safety, by lessening the friction against the rails and the danger of being thrown off the track. The only difference is, that by reason of the fixed position of the driving wheels of the engine, the truck, which has before been applied at each end of a car, can only be applied at the forward end of the engine, and therefore the accommodation of the movement of the engine to the curve of the track may be less complete than in the case of the car. The effect of the invention upon the engine, as compared with its effect upon the car, is the same in kind, though perhaps less in degree.

"It is settled by many decisions of this Court, which it is unnecessary to quote from or refer to in detail, that the application of an old process or machine to a similar or analogous subject, with no change in the manner of application, and no result substantially distinct in its nature, will not sustain a patent, even if the new form of result has not before been contemplated. \* \* \* \* \*

"In the case at bar the old contrivance of a railroad truck with the swiveling king-bolt, transverse slot and pendent divergent links, already in use under railroad cars, is applied in the old way, without any novelty in the mode of applying it, to the analogous purpose of forming the forward truck of a locomotive engine. This application is not a new invention, and therefore not a valid subject of a patent.

"The decree of the Circuit Court must therefore be reversed, and the case remanded with directions to dismiss the bill."

#### THE SCRAP HEAP.

##### A Relic of the Southern Railway Security Co.

The name of the now almost forgotten Southern Railway Security Co. appears in a suit held in the Superior Court at Atlanta, Ga., involving the title to a tract of land on the outskirts of that city. The suit is brought by the attorneys for the Atlanta National Bank against the Atlanta Real Estate Co., Henry B. Plant, William T. Walters and others. This property was purchased for the Southern Railway Security Co. in 1871. After the dissolution of that company it was transferred to H. B. Plant, of New York, in payment of certain claims held by him against the company, and was by Mr. Plant transferred in 1881 to an organization known as the Atlanta Real Estate Co. The plaintiffs in the suit were stockholders in the Southern Railway Security Co., and their bill charges that the estate of the company was never properly distributed, but was passed over to certain parties in payment of the claims which they held. They also charge that no proper accounting was ever made, and bring their present suit to see if they cannot recover something from the wreck.

##### A Train Driven 100 Miles by Wind.

An incident which we believe has never had a parallel in railroad history occurred on last Thursday on the Burlington & Missouri River Railroad between this city and Denver. Were it not that the story comes from the most reliable source we would unhesitatingly pronounce it a canard. But we have it from a source which is a guarantee of its correctness. At any rate it is a matter of record and can easily be verified if true and disproven if it is false.

It will be remembered that on Thursday there was a wind which amounted almost to a tornado here and was worse west of us. At Akron it unroofed the round-house and did some other damage. About 5 o'clock in the evening, when the wind was at its strongest, it started a train of eight box cars, loaded with coal, that were standing on the side-track at that place. Two brakes were set, but they were not enough to hold it and it ran through the split switch without being derailed and started east.

The track was nearly level where the train started, but there is down grade this side of Akron. The wind was so strong that it took the train more rapidly than the passenger trains over the line move, even on the level track, and when it reached a down grade of course the speed became something fearful.

The operator at Akron noticed the runaway train soon after it broke loose and sent the alarm down the line. Everything was ordered side-tracked, and the crazy train had the right of way. The Cannon ball train, going toward Akron, was only two stations away when the message to side track came, and it had only been on the side track a short time,

variously estimated at from two to five minutes, when the engineless train came thundering by.

Marvelous as it may seem, those runaway cars ran 100 miles, passing eight stations, over a track which is for a great part of the distance almost perfectly level, with no propelling power but the wind and their own inertia. They ran the 100 miles in less than three hours, and station agents and others who witnessed the strange train held their breath with awe as it whirled by at the rate of nearly a mile a minute. It passed Haiger at the rate of 40 miles an hour, and is said to have run the 20 miles of down grade this side of Akron in 18 minutes.

At Benkleman, 95 miles this side of Akron, a freight was standing on the side track. As the runaway train passed the engineer ran his engine out with a brakeman on the tender to make the coupling, and gave chase. It was an exciting chase, but the engine, which brought to the aid of the wind the power in the steam chests, soon closed the gap between itself and the flying train. About half way between Benkleman and Max the fugitive was overtaken, the coupling successfully made, and the cars, after pulling the engine some distance, brought to a standstill.

It was certainly a remarkable runaway, and we do not believe the annals of any railroad will show a parallel to it. —*Lincoln (Neb.) State Journal*, March 30.

#### A Runaway Train.

The jerk-water train on the Cincinnati Northern road that is run to Montgomery at night for the alleged accommodation of residents of Avondale, left the depot on schedule time, 9:55 o'clock, night before last. Soon after leaving the yard the train strikes a high trestle, upon which there are two tracks. There is a grade there of 185 ft. to the mile. At Effluent Pipe street the tracks converge and for some distance are so close together that they are equivalent to a single track, the lines at the northern end of this virtual single track branching away from each other. It will be readily understood that a train going north and another coming south could not pass each other on the strip of track regardless of what they might do on other portions of the road. No doubt that proposition is plain.

When the engineer of the Avondale accommodation reached the single track above described, and after his train had proceeded some distance up the trestle north of Effluent Pipe street, he discovered another train coming toward him full tilt from the north. He immediately recognized the fact that there was but one thing to do to attempt to save the lives of his passengers, and that was to reverse his engine and run the risk of getting back on that part of the clear track where it was safe on the trestle south of Effluent Pipe street.

To think was to act, and the brave fellow sounded the alarm whistle and threw his engine completely over by one desperate pull on the throttle lever. The engine trembled and labored for a few moments, but before it stopped and started backward down the grade it had run 200 yards on to the track that must be retraced. By a miracle it got to the proper part of the track just in time to save the passenger train from being smashed to pieces. As it was, the locomotives struck each other, but fortunately the passenger train did not leave the track. A difference of one second would have been fatal. As quickly as possible the brave engineer of the passenger train checked up and stopped. The freight train plunged down the grade on the other track at the rate of 50 miles an hour, flying past the passenger train and jumping the track, completely wrecking the engine and a portion of the train.

After the wreck of the freight train the astounding discovery was made that not a living soul had been on the engine at the time the train came bowling down the grade. It was at first thought that the crew had fallen to the ground beneath the engine, but it was learned later that the entire crew had left the freight train at a point some distance north of the scene of the accident, and therefore the train was a wild one, tearing along at its own sweet will.

The freight train was coming from Dayton, and the engineer was William Libby. He says that on account of the grade he lost control of the train at Montgomery Bridge, a quarter of a mile beyond Eden Park. He and the crew stuck to the train until they reached a point a square or so from Eden Park, when they abandoned it. He says that it is the easiest thing in the world to lose control of a train on that part of the Northern road.

The reason the wild freight train did not run into the yard and tear down a few houses was because it was seen coming and was purposely thrown from the track by the turning of a switch. —*Cincinnati News-Journal*, March 26.

#### Fight on a Train.

Passengers on the Chicago & Alton train which reached this city yesterday morning report a bloody affray on board the cars between the conductor, R. G. Dunsmore, and a merchant named Powell, who is in business at Gilliam, Mo. From the statements of witnesses it appears that Powell boarded the train at a way-station, and when Conductor Dunsmore asked for his fare Powell stated that he wanted to go to Gilliam. Dunsmore told him that the train did not stop at Gilliam and that he would have to go to the next stopping place, to which point he would have to pay his fare. Powell then demanded a return check from Glasgow to Gilliam, and Dunsmore said he had no authority to give it to him. Powell was highly indignant and heaped abuse on the head of the conductor, who said that he was simply acting under orders. The latter went on collecting fares and had reached the rear door of the second car from the last when he was assaulted from behind by Powell, who drew the conductor's head back with his left arm and tried to cut his throat with his right. The conductor received severe cuts in both cheeks in the struggle which followed, and the front of his clothing was drenched with blood. One of his hands was maimed, but he fought valiantly, and with the help of D. S. Williams, of Philadelphia, and W. M. Johnson, of Marshall, Mo., freed himself from Powell's grasp. Passengers interfered to prevent further trouble and Powell resumed his seat. Dunsmore borrowed a revolver and covering Powell with it disarmed him, and when the train arrived at Glasgow turned him over to a constable. Dunsmore left the train at Rockhouse, where he received surgical treatment. —*St. Louis Republican*, March 29.

#### The Baggage-man's Story.

"Yes, I was in quite an accident once," said the baggage-man, as he stood in the door of his car waiting for his train to start: "it was a queer accident, too, and I never want to see the like of it again. You see that long white spot there on the side of my head—that ridge? Well, that was the result of the little bust-up I'm telling you about. It was on the Lake Shore a good many years ago. On my run one day I had a sleeper—a corpse, you know—and as I was a through passenger I put it in the extreme rear end of my car. Nothing unusual happened till we got this side of Adrian a piece—that was before the Air-line was built when we struck a cow on the track and got thrown off. It was right on a high bank, too, and we went to the bottom with a good deal of a crash, I tell you. Trunks and boxes flew around there pretty lively. One of 'em struck me there where you see that scar. But the worst of it was the sleeper's box broke open as it came tumbling down to my end of the car, and the passenger stuck his head out to see



what was going on. I wouldn't a-minded that if he hadn't come quite so close to me. His banged-up box stopped right side of me, and his face came right down on mine. It makes me crawl yet to think of it. I had to stay there 20 minutes before the boys could get at me, with that clammy dead face, two weeks gone, up again mine. I believe my hair'd a-turned gray if there hadn't been so much blood on it from that hole in my head. No more mixes like that in mine, please."—*Chicago News*.

#### A Signal-Monkey.

A monkey signal-man manages the railway traffic at Uitenhage, South Africa, according to *The Colonies*. The human signal-man belonging to the post lost both his legs in a recent railway train accident, and so has trained a baboon to discharge his duties. Jacko pushes his master about on a trolley, and under his directions works the lever to set the signals with a most ludicrous imitation of a man.

#### Dynamite on the Tender.

At about 8:30 o'clock Tuesday morning a train of cars on the Ontario & Western Railroad was going to Burnside from Cornwall Junction. The train consisted of engine No. 51 and six construction cars. A number of trainmen were in the cab of the engine besides the engineer and fireman. They had brought with them some half-dozen dynamite cartridges, which were put in a pail on top of the tender. When the train reached a point near the Moodna Creek bridge the cartridge exploded with a terrible report. One side of the tender was blown out, and it was otherwise greatly damaged. The windows in the cab were demolished. None of the men in the cab were hurt. The engine went immediately to the shops at Middletown for repairs. The explosion was heard for miles around.—*Port Jervis Gazette*, March 27.

#### Racing on the Rail.

An exchange says: "Passengers on the West Shore afternoon train and the New York Central flyer have been treated very often since the snow and ice disappeared to lively races between the two trains on the way from Lyons to Newark. The interest taken in the trials of speed by the employees of the two roads and those who witness them is very great, and as the season advances the railroad men say that they will become even more interesting. From the Lyons station for a distance of about four miles west the tracks of the two roads are not over 200 ft. apart, and the greater part of the way they are less than 70 ft. apart. The race-course could not, therefore, be better if it had been laid out for this very purpose. The West Shore train leaves Lyons at 4:53, and just as it leaves the station the Central flyer usually comes tearing along. In an instant the full speed of the two locomotives is put on, and for four miles the trains have a red-hot race. The passengers usually enter heartily into the contest, and, raising the windows, wave their handkerchiefs to those on the rival train. The trainmen frequently become much excited over the contest, and large bets have been made upon the result of the race at a certain point along the road. A gentleman who has witnessed several of these contests recently says that for general excitement and fun there is nothing like it."

#### Tree Planting on the Lake Shore.

Passengers on the Michigan Division of the Lake Shore will see here and there along the road an evergreen or chestnut shade tree, a monument to ex-Superintendent Charles Paine and Division Superintendent Curtis. The Michigan Division of the road has a wild and varied scenery, while in some quarters it is very desolate. It was the intention to grow shade trees along the road, but the experiment, although expensive, was not a success. Up toward Chicago the land is so poor that the white sand drifts like snow, and a poor farmer in awakening in the morning is not at all surprised to find that his farm has blown away to the other quarter section. As might be expected the effort to grow shade trees on this land was unsuccessful. Other localities were equally unfavorable, and the project has been abandoned.—*Buffalo Express*.

#### A Conductor's Righteous Anger.

Just as the train on the Third Avenue elevated road was moving away from the Twenty-eighth street station, a few minutes after 8 o'clock last evening, a young man hastily dropped his ticket into the box and made a flying l-ap over the closed gate at the rear of the second car. He landed safely on the platform of the car, but his hat fluttered down into the street. The feat that the young man had performed was a dangerous one, and startled a dozen or more passengers who saw it. The burly conductor was dumbfounded at first, but as soon as he had satisfied himself that nobody had been hurt his whole being became suffused with indignation. "Wot do yer mean by jumpin' over that ere gate?" he shouted, laying a heavy hand on the trembling young man. "I didn't want to get left," was the apologetic reply. "Yer didn't; well, I reckon yer'll get left at the next station. Suppose yer had fallen into the street and smashed yerself all to pieces? I'd have bin in a nice fix, wouldn't I? Why, they would have docked me two weeks' wages." "Well, it's all right now?" said the young man. "Is it? said the conductor, as he opened the door to call out Thirty-fourth street station. "Here, you get off this train. I won't carry no such careless chap." The young man got off and the train went on.—*New York Times*.

#### ANNUAL REPORTS.

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#### Delaware & Hudson Canal Co.

This company owns a great anthracite coal property in Pennsylvania, to which its canal and railroad operations are chiefly auxiliary. It owns the Delaware & Hudson Canal, from Honesdale, Pa., to the Hudson River at Rond-

out, N. Y., 108 miles, and owns or leases and works the following railroad lines:

	Miles.
Plymouth, Pa., to Nineveh, N. Y.....	58.50
Branches and gravity roads.....	98.25
Cherry Valley, Sharon & Albany.....	21.00
Schenectady & Duaneville.....	13.75
Schenectady & Mechanicsville.....	19.00

Total owned.....	210.50
Albany & Susquehanna, leased.....	142.25
Rensselaer & Saratoga and branches, leased.....	182.75
New York & Canada, leased and stock owned.....	150.00
Total.....	475.00

Adding the canal, there are 793.5 miles of transportation lines worked. The company also owns nearly 200 miles of tramways and mine roads in its mines, of which about 150 miles are under ground. The report is for the year ending Dec. 31.

The condensed balance-sheet is as follows:

Liabilities:	
Capital stock.....	\$20,000,000.00
Bonds:	
1884.....	\$3,385,000.00
1891.....	5,549,000.00
1894.....	4,829,000.00
1917.....	5,000,000.00
Total.....	18,763,000.00
Interest and dividends payable Jan. 1884.....	694,325.00
Depositors.....	82,873.33
Dividends and interest unclaimed.....	40,134.01
New stock subscription and accrued interest.....	1,027,490.00
Surplus.....	2,005,305.87
Total.....	\$43,213,038.21

Assets:	
Canal.....	\$6,339,210.49
Railroad and equipment.....	6,937,188.38
Real estate.....	9,035,163.29
Mine improvements.....	2,388,709.02
Mine fixtures and equipment.....	407,620.00
Boats, barges and steamboats.....	500,640.00
Coal yards and fixtures.....	104,017.88
Lackawanna & Susquehanna R. R.....	1,022,928.15
Cherry Valley, Sharon & Albany R. R.....	300,000.00
New York & Canada R. R.....	3,597,074.48
Lackawanna Palace Car Co.....	54,675.36
Mechanicsville & Fort Edward R. R.....	52,112.88
Schenectady & Mechanicsville R. R.....	211,279.74
Albany & Susquehanna R. R., second track.....	120,161.90
Telegraph lines.....	14,734.80
Supplies on hand.....	1,466,142.71
Coal on hand.....	745,436.09
Advances to leased lines.....	921,663.24
Miscellaneous assets.....	2,139,808.59
Stocks.....	1,814,740.84
Advances on coal.....	648,224.90
Cash.....	2,318,497.29
Bills and accounts receivable.....	1,596,476.20
Total.....	\$43,213,038.21

Miscellaneous assets include \$1,970,000 Albany & Susquehanna consolidated bonds and \$159,808.59 other bonds. Stocks include \$354,000 Albany & Susquehanna, \$814,100 Rensselaer & Saratoga and \$146,640.84 other stocks.

The bonded debt was not changed in amount. Provision has been made for the payment of the bonds as they mature by the issue of new stock.

The coal tonnage for the year was as follows:

1883.	1882.	Increase.	P. c.
Produced from Co.'s mines.....	3,529,973	3,203,168	309,805 9.7
Transported for others.....	584,246	510,154	68,092 13.2
Total.....	4,094,219	3,713,322	377,897 10.2

The increase in tonnage was made in spite of suspensions of work amounting in all to 60 days.

The total receipts from all sources and the payments on all accounts, except dividends, were as follows:

1883.	1882.	Increase.	P. c.
Gross receipts.....	\$17,842,499	\$15,573,927	\$2,268,572 14.6
Expenses.....	12,450,174	10,422,334	2,033,850 19.5
Net earnings.....	\$5,392,325	\$5,151,603	\$234,722 4.5
Taxes, rentals and interest.....	3,390,482	3,313,402	77,080 2.3
Surplus.....	\$1,995,843	\$1,838,201	\$157,642 8.6

The profit and loss account was as follows:

Sales of coal to Dec. 31, 1883.....	\$9,575,362.18
Coal sold.....	52,403.39
Net earnings Pennsylvania railroads.....	888,559.49
Inter-est on investments.....	257,540.32
Miscellaneous profits.....	287,038.33
Profit on leased lines.....	1,904.90
Coal on hand Dec. 31, 1883, tons, 297,491.....	745,436.09
Total.....	\$11,808,244.50
Coal on hand Dec. 31, 1882, tons, 219.....	\$492,924.00
Mining coal.....	4,696,195.43
Transportation expenses, canal, etc.....	1,642,843.71
Transportation to Tidewater, by Erie.....	811,722.74
Rondout expenses.....	132,688.50
Weehawken expenses.....	39,921.17
Salaries, rent and miscellaneous and law expenses.....	145,026.06
Taxes.....	228,988.31
Interest.....	1,321,941.95
Total.....	\$9,812,401.96

Balance, profit for the year..... \$1,995,842.54

This surplus last year was equivalent to 9.98 per cent. upon the stock. Dividends amounting to 7 per cent. were paid, requiring \$1,400,000, and leaving a balance of \$595,843.

The operations of the leased lines, 475 miles, were as follows for the year:

1884.	1883.	Inc. or Dec.	P. c.
Freight.....	\$3,743,128	\$3,428,132	I. \$314,996 9.2
Passengers.....	1,603,381	1,628,287	D. 24,916 1.5
Miscellaneous.....	72,292	60,787	I. 11,505 8.2
Total.....	\$5,418,806	\$5,123,216	I. \$295,590 5.8
Working expenses.....	3,577,349	3,335,423	I. 241,926 7.2
Net earnings.....	\$1,841,457	\$1,787,793	I. \$53,664 3.0
Rentals paid.....	1,839,552	1,779,327	I. 60,225 3.4
Surplus.....	\$1,005	\$8,466	D. \$6,561 77.5
Gross earn. per mile.....	11.408	10.786	I. 622 5.8
Net earn. per mile.....	3.877	3.764	I. 113 3.0
Per cent. of expenses.....	66.01	65.10	I. 0.91

Both the gross and the net earnings of these lines show a considerable increase, which is entirely from freight traffic. The earnings of the company's railroad lines last year were as follows, stated in another form.

Earnings.	Expenses.	Net.
Albany & Susquehanna.....	\$2,498,698	\$1,615,439
Rensselaer & Saratoga.....	2,149,292	1,386,475
N. Y. & Canada.....	770,826	581,433
Total leased lines.....	\$5,418,806	\$3,577,349
Rentals paid.....		1,839,552
Surplus from leased lines.....		\$1,905
Pennsylvania Division gross earnings.....		\$1,998,837
expenses.....		1,110,278
Total.....		888,559

Total net results from railroad lines..... \$890,464

The earnings per mile for the Albany & Susquehanna were \$17,566 gross and \$6,209 net; for the Rensselaer & Saratoga \$11,761 gross and \$4,207 net; for the New York & Canada \$5,139 gross and \$1,262 net; for the Pennsylvania Division \$9,518 gross and \$4,231 net.

The President's report says: "The mining of coal was suspended 60 days during the year, and while prices were low, they were well maintained, thus justifying the policy of a proper restriction of the product."

"While the railroad system in its entirety yielded satisfactory results, the depression in the ore and iron industry seriously diminished the earnings of the leased lines, which was, however, partially overcome by the increased coal tonnage—953,000 tons having been transported over the Albany & Susquehanna and its connections."

"At the annual meeting of the stockholders an ordinance was unanimously adopted authorizing the increase of the capital stock from time to time as the bonded debt of the company matures, until the aggregate capital shall amount to \$50,000,000."

"Under this ordinance \$3,500,000 was offered at par in June last to the stockholders of record; \$2,877,100 of which was subscribed for, leaving \$622,900 in the hands of the company; the proceeds of said issue of stock are being used in the retiring of the \$3,500,000 of 7 per cent. bonds due July 1, 1884, all of which will be paid at maturity."

"The finances of the company are sound and strong, and the property is in first-class condition."

#### Chicago, Burlington & Quincy.

Advance sheets of the report of this company for the year ending Dec. 31, 1883, make the favorable showing, compared with the previous year, displayed in the table here annexed:

	1883.	1882.	Inc. or Dec.
Gross earnings.....	\$26,110,369	\$21,550,805	I. \$4,559,564
Expenses and taxes.....	13,490,477	11,283,963	I. 2,206,514
Net earnings.....	\$12,619,891	\$10,266,842	I. \$2,353,049
Int. and exchange.....	324,189	452,498	D. 128,318
Total income.....	\$12,938,071	\$10,719,349	I. \$2,218,731
Fixed charges.....	4,883,940	4,664,003	I. 219,937
Dividends.....	5,596,484	5,023,509	I. 572,975
Renewal fund.....	1,500,000	750,000	I. 750,000
Surplus.....	\$967,646	\$281,738	I. \$705,908

While gross earnings increased in the neighborhood of 21 per cent., operating expenses increased only about 19 per cent., enabling a very satisfactory increase in net earnings to be shown. The increase in fixed charges was 4.7 per cent., the dividends 10.9 per cent., the addition to the renewal fund 50 per cent. and the surplus for the year 250 per cent.

Below is a comparison of stock and bonded debt, etc.:

	1883.	1882.	Increase.
Capital stock.....	\$71,941,746	\$69,649,695	\$2,291,551
Funded debt.....	77,408,490	68,648,050	8,760,440
Total.....	\$149,349,736	\$138,297,746	\$11,051,990

Expended for road and equipment.....	3,333,005	14,194,810	.....
Miles operated.....	3,332.5	3,228.9	93.6
Earnings per mile.....	\$8.023	\$6.933	\$1.070
Net earnings per mile.....	3.870	3.312	56.4

The report dwells at length upon the causes of the increase in gross earnings, which are mainly the good judgment shown in making connections, and the growth of business consequent on the completion of the Denver and other extensions.

#### Cumberland Valley.

This company owns a line from Harrisburg, Pa., to Williamsport, Maryland, 82.2 miles. It leases (and chiefly owns) the Dillsburg & Mechanicsburg, a branch to Mechanicsburg, Pa., 7.7 miles; the Southern Pennsylvania, a branch to Richmond, Pa., with a spur to Mercersburg, 21.4 miles in all; and the Martinsburg & Potomac, from Williamsport to Martinsburg, W. Va., 12 miles. It owns but does not lease, the Mont Alto road, from Mont Alto Junction to Waynesboro, Pa., 18.3 miles. The 49th annual report is for the year ending Dec. 31, 1883.

The equipment consists of 25 locomotives; 25 passenger, 4 passenger and baggage, 4 mail and baggage and 3 express cars; 221 box, 23 stock, 187 gondola and 7 caboose cars.

The general account is as follows:

First-preferred stock.....	\$241,900.00
Second-preferred stock.....	243,000.00
Common stock.....	1,292,950.00
Funded debt.....	352,300.00
Dividends and coupons.....	47,872.50
Income account, balance.....	626,268.04
Total.....	\$2,804,290.24
Cost of road.....	\$1,917,986.92
Material on hand.....	41,814.14
Trustees of contingent fund.....	644,376.97
Balance of accounts.....	125,212.28
Cash.....	74,917.93
Total.....	2,804,290.24

The funded debt consists of \$161,000 first and \$109,500 second mortgage bonds. The amount given above includes also \$81,800 plain bonds, which matured Jan. 1, 1884, and were then paid off and canceled. The contingent fund is chiefly invested in the leased lines.

The traffic for the year was as follows:

	1883.	1882.	Inc. or Dec.	P. c.
Pass. train-miles.....	270,749	248,602	I. 31,147	12.5
Freight train miles.....	360,222	195,181	I. 165,041	33.4
Total locomotive miles.....	632,972	557,785	I. 75,187	17.7
Passengers carried.....	548,732	501,943	I. 46,789	9.3
Passenger-miles.....	11,154,814	9,708,700	I. 1,446,114	14.9
Tons freight carried.....	709,170	610,844	I. 98,326	16.1
Ton-miles.....	28,557,701	21,673,434	I. 6,884,267	31.8
Av. train load:				
Passengers, number.....	40	39	I.	1
Freight, tons.....	110	111	D.	1
Av. rate.....				
Per ton-mile.....	1.709 cts.	1.874 cts.	D. 0.165 ct.	8.8

The average passenger journey last year was 20.30 miles; the average freight haul, 42.26 miles. The increase was chiefly in through freight.

The earnings of the Cumberland Valley road, not including the leased lines, were as follows:

	1883.	1882.	Inc. or Dec.	P. c.
Freight .....	\$488,300	\$406,113	L. \$82,187	20.25
Passengers .....	257,750	234,750	L. 23,000	9.75
Mail, etc .....	40,772	58,443	D. 17,671	20.00
Total .....	\$793,663	\$689,306	L. \$103,757	15.10
Expenses .....	570,019	459,854	L. 110,165	23.80



The operations of the leased and controlled lines were as follows:

	Dill & Meeb. Mart & Pot.	So. Penn.	Mt. Alto.
Earnings.....	\$32,002	\$21,817	\$20,130
Expenses.....	15,048	19,797	30,934
Net earnings.....	\$17,554	\$2,020	\$4,305
Gross earn. p-m	4.234	1.818	1.117
Net earn. per m.	2.280	1.68	2.02
Per cent. of exps.	46.16	90.75	82.02

The Mont Alto road (the traffic of which is not included above) carried 66,537 passengers and 42,775 tons of freight. The passengers were chiefly excursionists to Mont Alto Park. The expenses were increased by the laying of 400 tons of steel rails.

The result of the year was as follows:

Net earnings, as above.....	\$223,044.36
Interest on bonds.....	\$26,548.00
State tax.....	933.60
Dividends, 10 per cent.....	177,785.00
	213,601.69
Surplus for the year.....	\$9,352.67
Balance from previous year.....	616,915.37

Balance, Dec. 31, 1883.....\$626,268.04

There were \$81,800 plain 6 per cent. bonds which matured Jan. 1, 1884. These were paid off from the contingent fund.

During the year 1,353 tons of steel rails and 45,931 new ties were put in the track. The main line is now all of steel from Harrisburg to Hagerstown, and a second track is laid from Bridgeport to Mechanicsburg. There were 3.57 miles of new sidings built and much new ballasting done. A new freight house was built at Hagerstown and a new passenger station begun there and several other buildings put up. One new iron span was put in the Harrisburg bridge and several new piers built.

Five locomotives, one passenger, one express, 33 box and two caboose cars were added to the equipment, and one old locomotive was sold. Since the close of the year two locomotives have been received, and another locomotive, one express, one combination and four passenger cars are under contract.

#### Norfolk & Western.

This company owns a main line from Norfolk, Va., to Bristol, 408 miles, with branches to City Point, 10 miles, and to Saltville, 10 miles; also the New River Division, from New River to Pocahontas, 75 miles, which was opened for business May 21, 1883. There are 371 miles of the main line and 44 miles of the New River Division laid with steel, and 287 miles are ballasted with stone, the rest with gravel. The report is for the year ending Dec. 31.

The equipment consists of 107 locomotives, 60 passenger cars, 2,205 freight cars, 374 transfer trucks and 352 caboose and service cars. Additions last year were 27 locomotives, 11 passenger cars, 655 freight cars, 100 transfer trucks and 57 caboose and service cars. Contracts have recently been let for 22 locomotives and 1,210 freight cars.

The general account, condensed, is as follows:

Preferred stock.....	\$18,000,000.00
Common stock.....	7,000,000.00
Funded debt.....	12,784,600.00
Subscriptions to improvement and extension loan.....	157,272.11
Car trust warrants.....	10,000.00
Collateral loan.....	1,000,000.00
Acc. unts. and balances, accrued interest, etc.....	9,951,254.00
January scrip divid. nd on preferred stock.....	325,000.00
Income account, balance.....	339,193.76

Total.....\$42,682,471.93

Road and equipment.....	\$31,334,572.11
Car trusts.....	1,916,893.52
Materials.....	153,377.65
Company's stock owned.....	3,025,600.00
Shenandoah V., stock and advances.....	4,250,000.00
Investments in other companies.....	1,296,236.00
Bills and accounts receivable.....	375,830.58
Cash.....	329,418.07

Total.....\$42,682,471.93

The company holds \$3,000,000 of its own preferred stock and \$25,600 common stock. The funded debt consists of \$496,000 old Norfolk & Petersburg bonds; \$1,544,100 Southside bonds; \$2,045,500 Virginia & Tennessee bonds; \$6,699,000 general mortgage bonds and \$2,000,000 New River Division bonds. The interest charge for the current year is \$804,106, or \$1,599 per mile of road. An issue of \$2,500,000 improvement and extension bonds has been authorized, as noted below.

The earnings for the year were as follows:

	1883.	1882.	Inc. or Dec.	P. c.
Freight.....	\$2,181,711	\$1,842,383	1.	18.4
Passage.....	485,801	444,301	1.	9.4
Mail and express.....	122,081	121,519	1.	0.9
Miscellaneous.....	22,580	21,537	1.	0.5
Total.....	\$2,812,777	\$2,429,740	1.	15.8
Expenses.....	1,609,574	1,322,577	1.	14.1
Net earnings.....	\$1,303,203	\$1,107,163	1.	17.7
Gross earn. per mile.....	5.942	5.677	1.	4.6
Net.....	2.736	2.557	1.	5.7
Per cent. of exps.....	53.7	54.4	D.	0.7

The increase in earnings was proportionally much larger than the increase in the mileage worked.

The income account was as follows:

Net earnings, as above.....	\$1,303,203.03
Interest, funded debt.....	\$780,635.28
" car trusts.....	24,970.11
" and discount, balance.....	5,186.67
	\$610,792.06
Surplus for the year.....	\$492,410.97
Surplus, Dec. 31, 1882.....	371,782.79
Total.....	\$864,193.76
Dividend on preferred stock, 3½ per cent.....	525,000.00
Balance of income.....	\$339,193.76

The dividend on preferred stock was made payable in scrip, representing net earnings used in construction.

The traffic for the year was as follows:

	1883.	1882.	Increase.	P. c.
Passengers carried.....	307,927	261,347	44,580	17.0
Passenger-miles.....	16,285,288	14,915,267	1,370,021	9.0
Tons freight moved.....	797,255	609,727	187,528	31.0
Ton-miles.....	155,521,749	133,957,973	21,563,776	16.0
At receipt:				
Per passenger-mile.....	2.98 cts.	2.98 cts.		
Per ton-mile.....	1.40 "	1.37 "	0.03 ct.	2.2

Of the passenger-miles last year 78 per cent., and of the ton-miles 47 per cent., were of local business. The increase in freight traffic was largely in coal, iron ore and other mineral freights.

Since the organization of the present company the policy of giving encouragement to local industries and reducing local rates has been visited with much success, as is shown by the following statement: For ten years preceding the reorganization the gross earnings have increased from \$2,061,769 in 1871 to \$2,064,194 in 1880, or only 3 per cent., while from 1880 to 1883 the gross earnings increased to \$2,812,777, or 36 per cent. During the same time the passenger traffic very nearly doubled, while the freight ton-

#### RAILROAD EARNINGS IN FEBRUARY.

NAME OF ROAD.	MILEAGE.					EARNINGS.					EARNINGS PER MILE.				
	1884.	1883.	Inc.	Dec.	P. c.	1884.	1883.	Inc.	Dec.	P. c.	1884.	1883.	Inc.	Dec.	P. c.
EASTERN ROADS.															
Eastern.....	284	284				\$ 277,913	\$ 271,430	6,483			\$ 2.4	\$ 2.4			
Grand Trunk.....	2,313	2,321			8	1,293,619	1,286,855	6,764			2.5	2.5			
Long Island.....	354	354				139,083	128,589	10,494			8.1	3.3	363	30	8.1
N. Y. Sus. & Western.....	147	147				64,140	66,697				2,557	3.8	477	454	17
Northern Central.....	322	322				398,613	486,865				18.1	1.23	1,512	274	18.1
Pennsylvania.....	2,103	2,048	55		2.7	3,426,713	3,712,105				7.1	1,629	1,813	184	10.1
Philadelphia & Reading.....	1,560	1,000	560		56.0	2,902,342	1,453,892	548,480			37.7	1,284	1,454	170	11.7
Rochester & Pittsburgh.....	204	125	169		135.2	84,211	21,478	62,733			202.1	286	172	114	66.3
West Jersey.....	188	177	11		6.2	67,180	62,056	5,124			8.3	357	351	6	1.7
Total, 9 roads.....	7,565	6,778	787		11.6	7,753,820	7,490,027	263,793			3.5	1,025	1,105	80	7.3
Total inc. or dec.....															

SOUTHERN ROADS.															
Alabama Great Southern.....	290	290				85,057	82,451	2,606			3.2	293	284	9	3.2
Chesapeake & Ohio.....	517	517				275,975	253,446	22,529			8.9	334	490	44	8.9
Eliz. Lex. & Big Sandy.....	130	130				40,350	55,478				15.14	310	427	117	27.5
Cin. N. O. & Tex. Pacific.....	336	336				10,011	154,12	6,100			4.0	477	459	18	4.0
East Tenn. Va. & Ga.....	1,098	1,059	39		3.7	320,391	312,522	7,869			2.4	292	295	3	1.0
Mem. & Charleston.....	292	292				109,610	102,002	7,608			5.4	372	353	19	5.4
Fla. Central & Western.....	234	234				38,613	33,565	5,048			14.9	165	143	22	14.9
Fla. Transit & Pe. Insular.....	243	243				46,615	38,911	7,704			19.7	162	161	31	19.7
Louisville & Nash.....	2,065	2,028	37		1.8	992,245	1,011,07				22,562	2.2	481	500	19
Mobile & Ohio.....	528	528				165,146	108,245				3,069	1.8	313	319	6
Nashville, Chattanooga & St. L.....	554	554				210,493	195,293	15,200			7.8	382	352	28	7.8
N. Orleans & Northeastern.....	195	42	153		364.3	38,738	5,301	33,437			630.9	199	126	73	67.9
Norfolk & Western.....	503	478	25		5.2	225,357	191,345	34,012			18.0	448	447	1	0.2
Shenandoah Valley.....	249	249				50,386	38,000	12,386			53.8	238	155	83	53.8
Rich. & Danville.....	757	757				333,755	329,348	4,407			1.4	441	435	6	1.4
Char. Col. & Augusta.....	358	339	19		5.0	82,911	94,109				11.178	119	233	278	45
Col. & Greenville.....	296	296				71,928	95,591				23,663	24.7	243	323	80
Virginia Midland.....	352	352				109,590	113,823				4,233	3.7	311	323	12
Western N. Carolina.....	200	190	10		5.3	55,08	27,557	27,526			27.3	175	145	30	20.1
South Carolina.....	247	243	4		1.6	144,054	149,758				5,704	3.8	583	616	33
Vicksburg & Meridian.....	142	142				44,911					2,107	4.7	301	516	15
Total, 21 roads.....	9,584	9,249	335		3.6	3,587,440	3,502,078	85,362			2.4	374	379	5	1.3
Total inc. or dec.....															

CENTRAL GROUP.																
Chi. & Eastern Ill .....	252	252				108,819	112,269				3,450	3.1	435	446	14	3.3
Chi. & Grand Trunk .....	335	335				232,004	188,658	43,346			23.0	693	563	130		23.0
Chi. & West Michigan .....	410	390	20		5.1	112,846	99,672	13,174			13.2	576	256	20		7.7
Cin. Ind., St. L. & Chicago .....	342	342				112,251	156,950				44,705	28.5	354	459	195	28.5
Cin., Wash. & Baltimore .....	284	284				106,082	124,361				18,279	14.7	374	438	62	14.7
Clev. Akron & Columbus .....	144	144				29,842	34,462				4,620	13.5	207	239	32	13.5
Clev. Col., Cin. & Ind. ....	391	391				281,053	315,540				34,487	10.9	719	807	88	10.9
Detroit, Lansing & No. ....	226	226				91,554	92,273				719	0.8	405	408	3	0.8
Evansville & Terre Haute .....	146	146				47,047	46,006	1,041			0.9	362	319	3		0.9
Fint & Fere Marquette .....	362	347	15		4.3	191,818	165,150	26,668			16.1	530	470	54		11.3
Illino. Central .....	1,529	1,501	28		4.7	800,100	847,439				47,339	5.5	524	563	41	7.7
Indiana, Bloom. & West. ....	695	695				212,831	202,931	9,900			4.9	306	292	14		4.9
Ind. Central .....	284	282	52		22.4	82,788	76,156	7,132			9.4	293	328	35		10.7
Ohio & Mississippi .....	615	615				253,011	283,909				30,098	10.6	411	462	49	10.6
Peoria, Decatur & Ev. ....	254	254				56,591	45,507	11,084			24.4	223	179	44		24.4
St. L., Alton & Terre Haute ..	195	195				122,778	128,766				5,988	4.7	630	660	30	4.7
Main Line .....	121	121				63,769	63,506	263			0.3	527	525	2		0.3
Belleville Line .....	152	152				18,653					90	0.5	122	123	1	0.5
St. L. & Alton .....	856	550	306		55.6	83,641	61,598	22,043			35.6	98	112		14	12.5
Toledo, C.N. & St. Louis .....																
Total, 19 roads .....	7,490	7,172	318		4.8	3,008,839	3,004,562	134,051			189,775	3.0	396	427		31
Total inc. or dec. ....			418		5.8			55,724			1.8					31
																7.3



## RAILROAD EARNINGS, TWO MONTHS ENDING FEBRUARY 29.

NAME OF ROAD.	MILEAGE.					EARNINGS.					EARNINGS PER MILE.				
	1884.	1883.	Inc.	Dec.	P. c.	1884.	1883.	Inc.	Dec.	P. c.	1884.	1883.	Inc.	Dec.	P. c.
<b>EASTERN ROADS.</b>															
Eastern.....	284	284	...	...	...	\$ 521,370	\$ 518,464	2,906	...	...	\$ 0.6	\$ 1,825	11	...	0.6
Grand Trunk.....	2,313	2,321	...	8	0.3	2,693,492	2,938,358	245,866	...	...	8.3	1,184	1,266	102	8.1
Long Island.....	354	354	...	...	...	272,974	258,693	14,281	...	...	5.6	771	731	40	5.6
N. Y. & West.....	147	147	...	...	...	178,195	134,804	43,391	...	...	6.6	872	917	45	4.9
Norfolk Central.....	322	322	...	...	...	808,458	886,117	77,659	...	...	18.0	2,511	3,082	571	18.0
Pennsylvania.....	2,103	2,048	55	...	2.7	7,000,946	7,411,572	400,626	...	...	8.4	3,329	3,731	402	10.8
Phila. & Reading.....	1,500	1,000	500	...	50.0	4,198,42	3,062,637	1,135,785	...	...	37.1	2,891	3,063	172	12.1
Rochester & Pitts.....	294	125	169	...	35.2	151,515	47,122	104,393	...	...	22.9	515	378	137	36.2
West Jersey.....	188	177	11	...	6.2	136,486	123,875	12,611	...	...	10.2	726	700	26	3.7
Total 9 roads.....	7,563	6,778	785	...	11.6	15,911,578	15,712,312	1,200,000	1,070,340	...	1.3	2,102	2,318	216	9.3
Total inc. or dec.....	...	...	785	...	11.6	...	...	199,366	...	...	...	...	216	...	9.3

<b>SOUTHERN ROADS.</b>															
Ala. Gt. Southern.....	290	290	...	...	...	169,181	167,046	2,135	...	...	1.3	583	576	7	1.3
Ches. & Ohio.....	517	517	...	...	...	557,370	505,416	51,954	...	...	10.3	1,078	977	101	10.3
Eliz., L. & B. S.....	13	130	...	...	...	86,175	103,391	17,216	...	...	10.7	663	795	132	16.7
Chas. N. O. & Tex. P.....	333	336	...	...	...	342,581	330,847	2,734	...	...	0.8	1,020	1,011	9	0.8
East Tenn., Va. & Ga.....	1,098	1,059	39	...	3.7	630,270	635,763	5,493	...	...	0.9	574	609	35	4.3
Memphis & Char.....	292	192	...	...	...	224,212	216,344	7,868	...	...	3.9	768	741	27	3.6
Fla. Cen. & West.....	234	234	...	...	...	78,992	75,156	3,836	...	...	5.1	338	321	17	5.1
Fla. Transit & Pen.....	243	243	...	...	...	18,410	11,250	7,160	...	...	21.2	4	33	29	21.2
Louisville & Nash.....	2,005	2,028	23	...	1.8	2,031,562	2,134,542	102,980	...	...	4.8	984	1,052	68	6.5
Mobile & Ohio.....	528	528	...	...	...	350,685	384,457	33,772	...	...	8.8	664	728	64	8.8
Nash. Chat. & St. L.....	554	554	...	...	...	397,487	392,651	4,836	...	...	1.2	717	709	8	1.2
N. O. & Nor'east.....	195	36	1.9	...	141.7	74,538	8,985	65,553	...	...	728.4	382	150	132	32.8
Norfolk & West.....	503	428	75	...	17.5	438,377	391,32	47,055	...	...	12.0	872	915	43	4.7
Shenandoah Val.....	249	249	...	...	...	115,525	80,498	35,027	...	...	43.7	464	323	141	43.7
Rich. & Danville.....	77	757	...	...	...	600,044	580,005	11,039	...	...	1.9	793	778	15	1.9
Char. Col. & Va.....	296	296	...	...	...	128,774	166,669	37,895	...	...	29.4	424	563	139	22.5
Col. & Greenb.....	352	352	...	...	...	216,75	218,211	1,456	...	...	0.7	616	610	6	0.7
Western N. C.....	200	190	10	...	5.3	64,295	47,647	16,648	...	...	34.7	321	251	70	28.0
South Carolina.....	247	243	4	...	1.6	262,889	279,191	16,302	...	...	5.8	1,064	1,149	85	7.4
Vicks. & Meridian.....	142	142	...	...	...	86,239	96,296	10,057	...	...	10.5	607	678	71	10.5
Total 21 roads.....	9,579	9,243	336	...	3.6	7,103,028	7,077,907	26,121	240,831	...	0.3	742	766	24	3.1
Total inc. or dec.....	...	...	336	...	3.6	...	...	25,121	...	...	...	...	24	...	3.1

<b>CENTRAL GROUP.</b>															
Chi. & Eastern Ill.....	252	252	...	...	...	234,110	251,373	17,263	...	...	6.5	932	997	65	6.5
Chi. & Gr. Trunk.....	343	343	...	...	...	461,579	423,570	38,009	...	...	8.9	1,378	1,264	114	8.9
Chi. & West Mich.....	410	390	20	...	5.1	217,933	201,636	17,337	...	...	8.6	551	514	37	8.4
Chi. Ind. St. L. & Chi.....	342	342	...	...	...	304,033	323,038	19,005	...	...	8.4	899	971	72	8.4
Chi. Wash. & Balt.....	254	254	...	...	...	239,912	275,214	35,302	...	...	12.8	845	969	124	12.8
Cleve. & Akron & C.....	144	144	...	...	...	61,404	71,490	10,086	...	...	14.2	426	497	71	14.2
Cleve. Col. & C. L.....	391	391	...	...	...	556,494	626,700	70,212	...	...	11.2	1,425	1,603	178	11.2
Det. Lan. & N. O.....	236	226	...	...	...	182,055	190,700	8,645	...	...	8.8	793	833	40	8.8
Ev. & Terre Haute.....	146	146	...	...	...	87,789	100,254	12,465	...	...	12.4	601	686	85	12.4
Flint & Pere Marq.....	362	347	15	...	4.3	378,267	355,704	22,563	...	...	6.3	1,045	1,025	20	1.9
Ill. Cent. & West.....	1,528	1,501	27	...	1.7	1,592,900	1,827,150	234,250	...	...	12.5	1,044	1,217	173	14.4
Ind. Bloom. & West.....	685	685	...	...	...	411,516	451,074	39,558	...	...	8.8	592	649	57	8.8
Ohio Central.....	284	282	2	...	22.4	170,548	154,525	16,023	...	...	10.3	601	609	8	0.8
Olaio & Mississippi.....	615	615	...	...	...	574,302	633,450	59,148	...	...	9.3	934	1,030	96	9.3
Peoria, Dec. & Ev.....	254	254	...	...	...	121,323	95,989	25,334	...	...	26.5	478	378	100	26.5
St. L. Alton & F. H.....	195	195	...	...	...	242,016	260,859	18,843	...	...	7.2	1,241	1,138	103	7.2
Main Line.....	121	121	...	...	...	128,106	135,438	7,332	...	...	5.4	1,039	1,119	80	5.4
Belleville Line.....	152	152	...	...	...	38,329	49,028	10,699	...	...	27.4	252	323	71	27.4
St. L. & Cairo.....	856	550	306	...	55.6	177,185	141,601	35,584	...	...	25.0	207	257	50	25.0
Total 19 roads.....	7,590	7,172	418	...	5.8	6,180,641	6,585,777	154,850	539,986	...	8.2	814	918	104	11.3
Total inc. or dec.....	...	...	418	...	5.8	...	...	405,136	...	...	...	...	104	...	11.3

<b>NORTHWESTERN ROADS.</b>															
Bur. Ced. Rap. & No.....	714	714	...	...	...	415,827	384,404	31,423	...	...	8.3	582	538	44	8.3
Central Iowa.....	401	305	96	...	31.8	249,114	157,265	91,849	...	...	33.0	321	514	193	13.4
Chi. & Alton.....	85	850	...	...	...	1,232,716	1,393,770	161,054	...	...	2.4	1,450	1,416	34	2.4
Chi. Mil. & St. P.....	4,700	4,52	178	...	3.9	2,765,000	2,616,241	148,759	...	...	6.5	585	579	6	1.1
Chi. & N. W.....	3,825	3,580	245	...	6.8	2,899,800	2,699,017	200,783	...	...	8.6	758	746	12	1.6
Chi. St. P. M. & O.....	1,240	1,170	70	...	10.3	671,600	594,273	77,327	...	...	13.0	521	508	13	2.6
Des Moines & Ft. D.....	148	138	...	...	...	53,699	41,592	12,107	...	...	29.3	389	311	78	29.3
Green Bay, W. & St. P.....	230	220	...	...	...	54,558	46,024	8,534	...	...	18.8	248	200	48	18.8
Ill. Ce. L. Iowa lines.....	402	402	...	...	...	255,000	248,766	6,234	...	...	2.5	631	619	12	2.5
Marquette, H. & O.....	163	100	63	...	3.0	39,111	36,880	2,231	...	...	6.0	380	369	11	2.9
Mil. L. & W.....	374	316	58	...	18.8	145,825	130,975	14,850	...	...	11.4	390	414	24	5.5
Mil. & Northern.....	227	185	42	...	22.7	69,695	54,835	14,860	...	...	27.0	307	299	8	2.7
Wisconsin Central.....	440	440	...	...	...	228,795	180,792	48,003	...	...	26.6	520	411	109	26.6
Total 13 roads.....	13,744	12,740	1,004	...	7.9	9,060,740	8,364,827	695,913	...	...	6.9	659	646	13	2.0
Total inc. or dec.....	...	...	1,004	...	7.9	...	...	695,913	...	...	...	...	13	...	2.0

<b>ROADS NORTHWEST OF ST. PAUL.</b>															
Canadian Pacific.....	1,982	1,150	832	...	72.3	493,244	382,844	110,400	...	...	28.8	249	333	84	25.2
Northern Pacific.....	2,449	1,535	914	...	59.5	1,083,800	757,549	326,251	...	...	45.0	443	493	50	10.2
St. P. & Duluth.....	227	216	11	...	8.1	129,225	154,549	25,324	...	...	4.0	569	641	72	11.3
St. P., Minn. & Man.....	1,387	1,250	137	...	10.9	850,434	879,376	28,942	...	...	2.0	617	733	116	12.2
Total 4 roads.....	6,045	4,153	1,892	...	45.8	2,562,703	2,154,318	408,385	...	...	10.0	424	520	96	18.5
Total inc. or dec.....	...	...	1,892	...	45.8	...	...	408,385	...	...	...	...	96	...	18.5

SOUTHWESTERN ROADS.															
Ft Worth & Den..	110	110	....	....	....	50,700	49,000	1,700	.....	3.4	461	445	16	.....	.....
Gulf, C. I. & S. F.	536	455	81	.....	17.8	274,754	295,605	20,851	.....	7.1	513	650	.....	137	21.1
Hous., E. & W. T.	140	120	20	.....	16.7	50,741	40,617	10,124	.....	8.7	362	389	.....	27	6.9
K. C. F. S. & Gulf.	389	389	.....	.....	.....	357,405	288,571	68,834	.....	2.9	916	742	177	.....	21.1
Little R.R. & Ft. S.	173	173	.....	.....	3.0	76,111	76,111	.....	.....	8.472	10	440	504	.....	64
Lat. R.R. Miss. R. & T.	173	173	.....	.....	.....	58,033	71,640	.....	.....	15,005	20.9	327	414	.....	87
St. L. Ft. S. & W.	160	128	32	.....	25.0	76,285	23,393	52,892	.....	236.0	477	183	294	.....	16.3
St. L. & San Fran.	759	724	26	.....	3.8	649,801	514,599	135,202	.....	26.2	866	711	155	.....	21.1
Vicks., Sh. & Pac.	110	73	37	.....	50.6	30,212	21,617	8,595	.....	39.5	275	296	.....	21	21.1
Total, 9 roads.....	2,541	2,340	201	.....	.....	1,622,644	1,395,645	221,327	44,328	.....	639	596	43	.....	.....
Total inc. or dec.....	.....	.....	201	.....	8.6	.....	.....	226,999	.....	16.3	.....	.....	43	.....	.....





Published Every Friday.

## EDITORIAL ANNOUNCEMENTS.

**Passes.**—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

## DENSITY OF POPULATION ON RAILROADS ACROSS IOWA.

Not enough attention is paid in planning railroads, and especially in investing in them, to the differing qualities of the districts which they penetrate, which have very much to do with the traffic obtainable. It often seems to be taken for granted that one part of the West, for instance, is as good as another, or will become so when railroads have made it accessible for a few years; that of half-a-dozen lines built equal distances apart across Minnesota, Iowa, Kansas or Nebraska, when those states were new, the population, production and traffic on one would be likely to be just about the same as on any other five or ten years after the opening of the roads.

This ignores the differences in the qualities of different parts of the same state, which, even when not strongly marked and not evident at sight, have a very great effect on the rapidity with which the country is settled. Men go to the country which offers the greatest attractions, which means, generally, that where production at the time promises to be most profitable and the increase in the value of the land most rapid.

Iowa offers an excellent field for studying the differing rates of rapidity of growth, as it is crossed from east to west by several parallel railroads, four of which were completed within a few years of each other, generally through different tiers of counties; and the western half of the state had scarcely any means of transportation except the Missouri River until shortly before the census of 1870, and was developed almost exclusively by these lines and their branches until the census of 1880. Below we give the population of the counties directly on each main line across the state, going from the east to the west. When the road passes nearly on the line between two counties both are given, as they may have been equally developed by it, but one of the two is prefixed by a letter *n* or *s*, to indicate that it is north or south of the line of the railroad. The date of the completion of the road to the Missouri River is given over its initials. It is to be borne in mind that the counties are of varying sizes, and that in the eastern half of the state the railroads had been built for different lengths of time, and many of the counties were pretty well peopled before there were any railroads:

1879. C. M. & St. P. Iowa & Dak. Div.	Popu- lation.	1870. Ill. Cen.	Popu- lation.	1867. C. & N. W.	Popu- lation.
Clayton.....	28,829	Dubuque.....	42,996	Clinton.....	36,763
n Alameda.....	19,791	Delaware.....	17,950	Cedar.....	18,636
Winnebago.....	23,338	Buchanan.....	18,546	Linn.....	37,137
s Fayette.....	22,358	Black Hawk.....	23,913	Benton.....	24,888
Chickasaw.....	14,534	Butler.....	14,293	Tama.....	21,585
Floyd.....	14,077	s Grundy.....	12,639	Marshall.....	23,752
Cerro Gordo.....	11,461	Hardin.....	17,807	Story.....	16,906
Hancock.....	3,453	n Franklin.....	10,249	Boone.....	20,828
Kossuth.....	6,178	Hamilton.....	11,252	Greene.....	12,727
Palo Alto.....	4,231	Webster.....	15,951	Carroll.....	12,351
Clay.....	4,248	Calhoun.....	5,595	Crawford.....	12,413
O'Brien.....	4,155	n Pocahontas.....	3,713	Harrison.....	16,649
Sioux.....	1,426	Buena Vista.....	7,537	Pottawatomie.....	39,850
Lyon.....	1,968	Cherokee.....	8,240		
		Plymouth.....	8,566		
		n Woodbury.....	14,966		

1882. C. M. & St. P. Iowa & Dak. Div.	Popu- lation.	1869. Rock Island.	Popu- lation.	1869. C. B. & Q.	Popu- lation.
Jackson.....	23,771	Scott.....	41,266	Des Moines.....	33,069
Jones.....	21,052	Muscatine.....	23,170	Henry.....	20,986
Linn.....	37,137	n Cedar.....	18,936	Jefferson.....	17,469
Benton.....	24,888	Johnson.....	25,429	Wapello.....	25,285
Tama.....	21,585	Iowa.....	19,231	Monroe.....	13,719
Marshall.....	23,752	Poweshiek.....	18,936	Lucas.....	14,530
Story.....	16,906	Jasper.....	25,963	Clarke.....	11,519
n Boone.....	18,838	Polk.....	42,305	Union.....	14,960
Dallas.....	18,746	Dallas.....	18,746	Adams.....	11,388
Guthrie.....	14,394	s Madison.....	17,224	Montgomery.....	15,895
n Green.....	12,727	Guthrie.....	14,394	Mills.....	14,137
Carroll.....	12,351	s Adair.....	11,667	n Pottawatomie.....	39,850
Crawford.....	12,413	Cass.....	16,943		
Shelby.....	12,696	Pottawatomie.....	39,850		
Harrison.....	16,649	Shelby.....	12,696		
Pottawatomie.....	39,850				

As these counties vary much in size, and there are more counties on some of the lines than on others, we have in the following table given the average population per township of each county, or pair of counties, opposite to the average of the other counties equally far west on the parallel roads. Thus the Mississippi at McGregor, where the northern line of the Milwaukee & St. Paul begins, being one county further west than at Dubuque, where the Illinois Central begins, no figure is in the first line for the Milwaukee & St. Paul. Thus the figures on the same line in the table represent almost exactly the density of population on each road on the same meridian.

Average population per township in each county on the seven railroads across Iowa, from east to west:

Wabash.....	Chicago, Burling- ton & Quincy..	Rock Island.....	C. & Pac. Div. C. M. & St. Paul..	Chicago & North Western.....	Illinois Central.....	I. & D. Div. C. M. & St. Paul.....
.....	3,000	4,301	1,321	1,936	2,529	.....
1,749	1,558	*1,496	1,316	*1,230	.....	1,220
1,074	1,496	1,857	1,857	1,857	1,160	*1,158
1,043	1,201	1,245	1,245	1,245	1,405	1,038
1,163	1,456	1,079	1,079	1,079	*808	1,050
1,093	2,107	1,184	1,298	1,485	*877	716
1,188	1,143	1,298	*1,180	1,057	703	207
1,075	1,085	2,646	1,172	1,302	798	221
780	1,249	1,124	900	795	*292	258
977	990	*812	772	772	471	266
1,325	1,325	1,060	708	621	515	260
*1,326	1,503	1,503	*1,264	1,513	349	258
.....	.....	.....	.....	.....	625	109
.....	.....	.....	.....	.....	.....	.....
1,095	1,490	1,513	1,192	1,223	863	653

\* Average of two counties, one north of the other.  
† Average of two counties, one west of the other.  
‡ Average of three counties on Missouri River.

The Chicago & Northwestern was the first line completed across the state, but the Rock Island, the Burlington and the Illinois Central followed shortly after. Though the Wabash was the last to be completed, nearly every one of the counties on its line had been provided by a railroad outlet by the Chicago, Burlington & Quincy before the Wabash was built, and their development is not due to it, as the development of the counties on the new Council Bluffs line of the Milwaukee & St. Paul was not due to that road, every one of those counties being on the Northwestern or the Rock Island.

The eastern half of the state was comparatively well settled in 1870. We see that for eight counties west of the Mississippi on the central line—that is, as far as the county next west of that in which Des Moines is situated, and 280 miles west of the Mississippi at Clinton, 210 west of Davenport and 180 west of Burlington—the density of population is approximately the same on all the roads in the southern half of the state—on the Northwestern and further south. But on the Illinois Central and the Iowa & Dakota line of the St. Paul the population becomes notably lighter than that on the roads further south, three counties, or 65 miles, further east, and within 100 miles of McGregor and 125 of Dubuque. On all the lines the population is less dense west of the meridian of Des Moines than east of it, but the difference is least on the three southern lines, considerable on the Council Bluffs line of the St. Paul and the Northwestern, great on the Illinois Central, and enormous on the Iowa & Dakota Division of the St. Paul, on which for seven counties the population averaged but 241 per township, against an average of 536 in the corresponding counties on the Illinois Central, 1,008 on the Northwestern, 999 on the St. Paul's Council Bluffs line, 1,429 on the Rock Island (this goes east far enough to take in Des Moines), 1,230 on the Burlington, and 1,078 on the Wabash. Thus the northernmost of the lines across Iowa on the western 280 miles of its road had a population in 1880 not half as great as that on the Illinois Central equally far west, and not one-fourth as great as on any of the other five lines further south.

What caused Southwestern Iowa to settle so much more rapidly than Northwestern Iowa? More than one cause, doubtless, but the chief one almost certainly

was that in Northwestern Iowa farming was (and probably still is), on the average, much less profitable than further south, a fact which will, we believe, be confirmed by observation of those who have carried on farms for a considerable period in either section—a much larger proportion in Southwestern than in Northwestern Iowa have become well-to-do. This is not due to difference in soil, for there is as good in Northwestern Iowa as anywhere, and very little there that is not good, but apparently to different meteorological conditions, and chiefly to a lighter summer rainfall, the severer cold not being a drawback for some kinds of farming. But certainly something also was due to an accumulation of misfortunes for several years when the country was first fairly opened. Since 1830 it has done fairly well, and it has grown since then much more rapidly than ever before, so that the census figures, given above by no means represent the present density of population.

The extreme northern railroad line, which for the most part passes through the second tier of counties south of Minnesota, was not completed to the western border of the state until 1879, and four of the westernmost counties on it had no outlet until then. This would sufficiently account for their light population; but it was completed to Algona about 1870, and the three counties which for years had had a railroad outlet were as thinly peopled in 1880 as the others, with not a third of the population that there was on the Illinois Central next south, and not a fifth of that on the roads further south. Moreover, the Illinois Central itself had a much lighter population, we see, than the lines further south, and it was completed to the western border of the state nearly as soon as the Rock Island and the Burlington, which have about three times as great a population per township in their western counties; and the Northwestern, next south of the Illinois Central—the first railroad opened across the state—has a decidedly lighter population than two roads south of it which were opened afterward. Thus, if we may judge by the number of people which the country has attracted, its quality falls off from the Rock Island road northward.

We have before called attention to one fact that might have affected the rapidity of settlement on the different lines. The Burlington and the Rock Island owned and sold the lands that were granted to aid the construction of their roads, the land grants of the Northwestern and the Illinois Central (which lease and do not own their lines across Iowa) became the property of a land company, whose interest was simply to make the largest profit out of the land, regardless of the effect on the traffic of the railroads. How much effect this had it is hard to tell, for it would depend much on the character of the stockholders in the land company. If they wanted quick returns, they would be likely to accept low prices; if they were indifferent to present dividends, they might prefer to hold the land in expectation of a great rise in prices eventually. Actually, prices of land along the Northwestern were generally lower than on the Rock Island and the Burlington about 1874, but perhaps they were higher in proportion to value, and so prevented a more rapid growth of population.

Though we cannot know exactly how great the growth of this northwestern part of Iowa has been since the Census was taken, yet as this is purely an agricultural and grazing country a rapid growth there should be felt in the acreage under cultivation and the live stock owned in the whole state of Iowa. The acreage of the principal grain crops and the number of animals in Iowa by the Census of 1880 (which gives the acres for the crop of 1879 and the number of animals June 1, 1880), and by the reports of the Department of Agriculture for 1883 were:

	1883.	1879.	Inc. or Dec.	P. c.
Corn, acres.....	6,980,921	6,616,144	+	364,477 5.5
Wheat ".....	2,435,300	3,049,288	+	613,988 20.1
Oats, ".....	2,005,569	1,507,577	+	497,992 33.2
Total acres.....	11,421,498	11,173,009	+	248,489 2.2
Horses, No.....	891,173	792,322	+	98,851 12.5
Milk cows, No.....	1,085,077	854,187	+	230,890 27.0
Other cattle, ".....	1,855,810	1,757,849	+	97,961 11.3
Hogs, ".....	4,800,998	6,034,316	+	1,233,318 20.4
Sheep, ".....	497,161	455,359	+	41,802 9.0

The decrease in hogs was in value equivalent to nearly 40 per cent. of the increase in other animals, leaving the net increase equivalent to 61 per cent. This is a very small increase for a state with so much uncultivated prairie land as Iowa has. The increase in the three principal grain crops has been insignificant; we have no statistics of meadows and pastures, but there must have been a considerable increase of these because of the increase in cattle. But the increase in grain and live stock production since 1879 cannot have done much toward affording traffic to the 2,500 miles of railroad built there since that year which is an increase of more than 50 per cent.

It would seem from this that however large the



immigration into Northwestern Iowa since 1879, there cannot have been a large area got under cultivation there yet, for there appears to have been but little increase in this in the whole state, and certainly none of it has been abandoned, though doubtless much grain land has been made into meadow.

Since 1880 this then thinly peopled northwestern quarter of Iowa has been gridironed with railroads, and absence of an outlet can no longer be pleaded by any part of it as an excuse for not growing. Considering how unprogressive the country had been, it seems probable that railroad building has been overdone there. About the beginning of 1879 there were there—north of the counties on the main line of the Northwestern and west of Worth, Cerro Gordo, Franklin and Webster—a district with 22 counties and 370 townships, but only 121,399 inhabitants, or an average of 323 per township—about 225 miles of railroad. Now there are in operation there 890 miles, the mileage having been quadrupled within the past few years. Then there were 59 square miles of territory for every mile of railroad; now only 15; then the population was 540 per mile of railroad; it must have doubled (and may have) since the census to be 270 per mile now. It is still much too light to afford an adequate support at present to all the railroads there, we may be sure. But as a considerable part of them were built to connect with and give an outlet for through traffic to Dakota and Minnesota railroads, they will not depend wholly on the country on their own lines for support; and as most of them were built by companies which will get a through haul of from 400 to 900 miles on the shipments of this country, it is easy to see why they were anxious to get a line across it before the country was occupied by their neighbors. Notwithstanding which, it will not be strange if some of these lines should for years to come be a burden on their owners, as were so many lines in Western Minnesota and in Northern Iowa further east after 1871.

#### FOG.

Of the sentences which we have always to "keep standing" for use in our accident record, the ostensibly explanatory one, "there was a dense fog at the time," comes in play quite often at this season, and the frequency of its appearance suggests the query whether the fact which it indicates really is a palliative of somebody's apparent carelessness, as is frequently more or less distinctly implied in the published accounts as we find them, or is, on the contrary, only an additional reason for regarding a case of negligence as blameworthy. Although numerous localities are exceptionally free from fogs, there are doubtless few railroads whose lines for any considerable distance are so situated as to relieve their managers of all necessity for considering the subject; so that we may, practically, regard the question of how to avoid these accidents as one of universal interest.

Minute particulars concerning collisions which occur during a fog are not very often given, doubtless because but few of them, comparatively, belong to the most serious class. Probably a large majority of them are the result, not of that kind of carelessness which we term "gross," or even of the next milder degree, but rather of that kind of slips where *nearly* all the proper precautions are taken, just one stitch being dropped at a juncture where it causes as much trouble as a dozen would at some other time or place. Many of the blunders are doubtless committed by comparatively intelligent employes, who have a more or less vivid idea of the dangers they should guard against, and whose surprise at the fact that they have just missed the bull's-eye is the first realization they have of the fact that their aim was defective; that they have made a *small* error in judgment, but which is an *error* all the same.

Although the regulations do not generally say so in explicit terms, the universal plan of running trains is based on the employment of just two principal conditions under which trains may be moved: the engineman either must look out for every variety of obstacle, "keep his train under control," or else he must proceed under the assumption that the track is clear, not looking ahead at all; he must either assume that all other trains will give him *ample* notice when they get in his way, or on the other hand must give the same ample notice himself, treating opposing trains as entitled to the same protection that he expected for himself when running under the first-named condition. This principle divides trains into two diametrically opposite classes, and to an indefinite or ambiguous statement of this fact (on the part of the management) or a partial and careless appreciation of it (on the part of employes) may doubtless be attributed a large share of the collisions we are considering. The facts, so far as ascertainable, verify this opinion. Collisions

of this class nearly always occur in yards or near them, circumstances which require a train to be "kept under control" being infinitely more numerous there than they are on the open road. The Manhattan Elevated road in New York City is treated as all "yard"—that is, trains are required to be kept *always* under control (so far as other trains are concerned), and the comparative frequency of collisions on this road on foggy mornings is without doubt due to the lack of a vivid appreciation on the part of the engine-runners of the exact meaning of the term "under control." In a superficial view of the matter, the frequency of the trains might be regarded as the cause of the trouble; but this is, properly speaking, an incidental circumstance. A train should be kept under control as regards a *certain locality*, no thought being taken as to *what* the possible obstruction may be. Runners who should reduce speed at a certain place *invariably*, allow themselves to indulge in speculation as to what the chances are of a certain train's being found in their way. Conductors who ought to send out a red signal at certain places, *always without delay*, stop to calculate the probable time of the arrival of the next train, carelessly overlooking the fact that it is not any particular trains but *all* possible trains that are to be guarded against; and on these apparently innocent-looking rocks both conductors and enginemen wreck themselves.

Superintendents always word the rules so that by the letter of the law the whole blame in collisions, etc., shall fall upon the men in charge of the trains; but broadly speaking, the management is often blameworthy, because experience has amply shown that in hundreds of instances the maker of the rules and those who are intrusted with their execution take different views of their meaning; and nothing can be clearer than that a manager who knows, or even suspects, that this is the case should take prompt steps to reconcile the conflicting views. He should enlighten his subordinates of his own motion, and *not* wait for them to come to him.

Many careful and conscientious managers neutralize the good effect of their rules by trying to make them too good; a certain Western road tells its train-men to "approach all stations, water tanks and coaling places *under complete control*," etc., and then takes away at least half the force of the injunction by adding, "This will not relieve the conductor of the forward train from signaling the approaching train and taking all necessary precautions to prevent accidents." This leaves each train to decide for itself where its own responsibility ends and that of the other one begins. If trains are to approach with care, there is little if any need of warning them, and the conductor at the station will act accordingly; on the other hand, if all necessary precautions are to be taken by the standing train, the approaching engineman will very naturally assume that there is no necessity for any *special* watchfulness on his part. But under the rule in force on a prominent Southern road, that "in cases of \* \* \* trains approaching stations, etc., *the entire responsibility* of guarding against collisions rests with the approaching train," there is a definiteness which admits of no evasion by the most heedless conductor; and the dullest mind cannot fail to understand what is meant by being "under control," whether there be a thick or a thin fog, or none at all.

The force of this sentence ("Keep your train under control") is necessarily modified by a multitude of circumstances, and may perhaps hardly mean the same thing twice in a hundred-mile trip. This leaves a wide margin for the exercise of good judgment by train-men; but it is at least essential that all concerned should attach precisely the same meaning to a given term; and the remedy for existing misunderstandings must come from the management. Darkness never asks to be enlightened; the light must make the first move. When the fog is brushed away from the theories, the practice will be far less affected by physical fogs.

#### The Worst Defect of Track Once More.

We publish in another column a letter, called out by a recent editorial article in our issue of March 28, from the supervisor of one of the best pieces of track in the United States. We are pleased to receive such prompt testimony to the truth of what we said about the use, or rather non-use, of the level.

We apprehend, however, that our correspondent has not correctly caught the moral which we *most* wished to enforce. As the subject is an important one we return to it once more.

It is true enough that the use of the spirit level is greatly neglected by section-foremen—far more generally neglected than the managers of the track department, or even road-masters in immediate charge, have any idea of. A partial remedy for this, no doubt,

can be found by impressing upon section-men that the level *must be used*, and giving them positive orders which they will be unlikely to disregard. In order that such orders may be given, such a test as we proposed of the actual effect of bad level would be a useful one for the higher officers to make.

But is is a universal experience that "molasses will catch more flies than vinegar." Orders are all very well, but orders are a poor substitute for making every man realize that what he is told to do is really the necessary and proper thing to do. It will be difficult to drive section foremen into using the level more, or even to convince them by argument that they should do so. They *think*, in their hearts, that certain other things are more important, and so, to tell the truth, do many of their superiors. The greatest need of all, therefore, is some ever-present monitor which shall impress upon them the true relative importance of existing defects in their track. That the common track-level is of very poor device for this end was what we especially hoped to make clear.

The case stands this way:

1. Defects of line are forced constantly on the trackmen's attention (and every inspector's attention) without the least trouble on their part. They cannot help seeing them if they would. Therefore, the line is—not too good of course, but—disproportionately good.

2. In less degree the same is true of gauge. Defects of gauge exist and are an evil, but are not a crying evil.

3. In still less degree the same is true of the surface. By taking the trouble to stoop down or even without doing so, the rays of light serve partially well all necessary purposes to keep *each rail separately* in tolerable surface or to reveal when it is not. The worst difficulty is that the eyesight affords no indication of the relative *solidity* of the bed of the ties, so that the unloaded ties may be in good surface and yet when loaded in very bad surface. In passing on and off of bridges and culverts this difficulty becomes especially great.

4. To keep the two rails at a proper level *relatively to each other* the eyesight does not assist at all, and we have nothing but the track level, which is not always at hand, and when it is at hand, can only be used with some little trouble and loss of time. But this is not the worst. When the trouble and time are taken the level does not indicate just what is wanted. The track, one may say, is never precisely in level—it is even an open question whether it is necessary to have it so, provided the inequality of level be a uniform one. To tear up the track, therefore, every time the slightest inequality was indicated would be an endless job. Even to test a whole section for level with a common track level, at frequent intervals, is almost equally impracticable. What is wanted is something which, without trouble or loss of time to the trackman, will effectually reveal to him the *true* condition of his whole track as respects level, just as his eyesight reveals the true condition of his whole track as respects line.

This, we believe, can best be secured by attaching a large and properly protected level to the section hand-car, in such position as to be as easily visible as possible and as little liable to breakage. Such a device as we tried to point out would not only have an advantage over the common level in being always present and always working when the hand-car was in use; but it would serve a purpose which the latter never can serve by revealing the relative condition of the whole track, and showing not only where but how irregularly it was out of level.

It is useless, we say again, to try to drive men by orders into correcting an evil, the importance of which they do not appreciate. It is almost as useless to try to persuade them by argument or theories into a belief which they cannot see the grounds for. Section-men cannot be expected to gauge the importance of defects in their track by any other standard than what they can see of them. They ride very little on trains, and even if they did could not make even so simple an experiment as that suggested in our issue of the 28th ult. as successfully as the road-masters and engineers over them, for whom we chiefly wrote.

The latter we would again urge to make the simple observations which we suggested on the sequence of cause and effect between irregularities of level and impacts against the rail. Some of them will have a new sense wherein their track is defective and how to seek a remedy. All of them will more fully appreciate than before that the trackman needs a better tool, not only to reveal to him the worst defects of his track, but to assist him in intelligently remedying them without waste of labor.

There is no one direction in which a roadmaster can so cheaply obtain for himself a reputation for improvement in track during the season which is now at



hand as by concentrating his attention chiefly upon this one defect. But he must begin by showing his trackmen what they cannot now see and have no means of seeing, and not by giving them orders or even arguing with them.

There is little danger in assuming that there is not at this time a single railroad section in the United States that is adequately inspected as to level, in such manner as to have anything like the same check upon it as there is upon defects of line, through the assistance of the natural eyesight, or in such manner as to be in anything like as good relative condition as to level as it is as to line.

Therefore—practically speaking, for this one reason alone—nearly all track rides more or less badly; it is only a question of degree. Therefore this is, as we began by saying, the worst defect of track, as it now exists.

#### The Last Erie Report.

The report of the New York, Lake Erie and Western Railroad for the year ending with September last did not appear until the middle of March, so late that there was comparatively little interest in it. We published an abstract of it two weeks ago; but though the report is in the usual form, which has been in many respects very full and clear, it is made almost valueless for purposes of comparison because of the inclusion of the New York, Pennsylvania & Ohio for five months of the fiscal year. We have heretofore succeeded in disengaging the gross earnings of this road from those of the old Erie, but all statistics of traffic, train mileage and working expenses include those of the leased road for these five months, and therefore we cannot tell from the report whether the traffic has increased or decreased, or what the course of the average train-load, the receipt and expense per unit of traffic have been. If the New York, Pennsylvania & Ohio had been leased for the entire fiscal year, and that coincided with the fiscal year for which it has made its own reports heretofore, we might consolidate statements for the two companies for the previous years, and thus get figures with which those of the last report might fairly be compared. But the Ohio road's reports have been for the calendar year; and apparently the history of the course of the Erie road is cut short in two by its last fiscal year, so that comparisons with all previous years will have very little significance.

The last report, for instance, shows a large increase of traffic over 1881-82—355½ millions of ton-miles and 22 millions of passenger-miles. How much of this was on the New York, Pennsylvania & Ohio? All we can say is that in 1882 the traffic of the latter amounted to 604 millions of ton-miles and 66 millions of passenger-miles, and that five-twelfths of this is 289 millions of ton-miles and 27½ millions of passenger-miles. But the traffic of these five months may have been greater or less than the average in 1882, and we cannot say from these figures whether there was more or less traffic on the two roads last year. So with train mileage: there is a large increase, but how much of it was on the Ohio road during the five months of the lease we have no means of knowing. The average freight-train load is reported as having fallen from 228 to 211 tons; but it was on the Erie alone that the freight-train load was so large in 1882; on the Ohio road it was but 146 tons, and for aught we know the average train load may have increased on both roads last year. As to the average rate per ton per mile, there is pretty good (though not conclusive) evidence that it increased last year, for it was 0.78 cent per ton per mile, against 0.749 cent on the Erie and 0.62 cent on the Ohio road the year before. But the average rate may have been much higher than 0.62 cent on the Ohio road in 1882 during the five months from May to September. And so we may go on. There is little significance in the comparisons, because the things compared are not of the same kind. And as the lease covered but five months of last year, the figures in the report for the year ending with next September will likewise represent something different from those of last year and all previous years.

We may infer something from the fact that the increase in maintenance expenses was much greater than that in other expenses, and was especially great in maintenance of way, and next to that in maintenance of cars.

It is especially disappointing not to be able to follow the course of the coal traffic of this road, which in a few years has grown to enormous proportions, amounting in 1881-82 to 31½ per cent. of the total freight traffic. In tons carried there was an increase (including the Ohio road for five months) of 894,588. In the whole of 1882 the Ohio road carried 1,079,614 tons of bituminous coal, five-twelfths of which would be about 450,000 tons. The 149,338 tons of anthracite carried then came doubtless almost exclusively from

the Erie and then each ton counted as two, while now it counts as but one. The indications are that there was some increase in the coal traffic of the Erie proper last year, but we cannot tell from the report nor do more than guess how great the increase was if there was any.

Of course, whenever there are great additions made to a railroad system, comparisons are ruined in a similar way. But the cases are not very frequent when a considerable railroad, with a developed traffic, is added to a system, and they are very few indeed when the statistics of traffic have so great an interest for the whole country as those of the Erie. It and the New York Central and Pennsylvania had reported for many years for a mileage which did not change enough to have much effect, and the three were the outlets for an enormous traffic from scores of thousands of miles of railroad further west. Together they served very well as a key to the general course of traffic, rates and earnings in the country; and comparison of one with the other always had great interest. We regret exceedingly, therefore, that there should be so serious an interruption to the continuity of these statistics. This could be avoided by making a separate statement for the Erie, and as the terms of the lease require the accounts to be kept separately for a large part of the business, this probably would not be very difficult. In the present form, we feel that the Erie reports will have not a tithe of their former value for general purposes. They present just as heretofore the financial position and results, but what has made them valuable to others than those interested in the Erie Company is absent, and will not appear again until in the course of years we shall have another series of reports covering substantially one and the same system. The vast growth of the Wabash, the Chicago, Milwaukee & St. Paul and other roads has made comparisons of one of their years with another of comparatively little value also, it is true, but we could spare all these much better than the Erie.

We begin the publication this week of a most interesting account by the venerable Mr. Horatio Allen of the facts attending the selection, purchase and trial of the first locomotives used in this country—the first beginning of the immense railroad system of America. Mr. Allen was Resident Engineer during the construction of the railroad connecting the Delaware & Hudson Canal at Honesdale, Pa., with the anthracite coal mines. This was just after the Stockton & Darlington Railroad had proved successful; but it had not been determined that locomotives should furnish the motive power of the Delaware & Hudson Canal Company's railroad until it was nearly completed, and until Mr. Allen had left the service of the company, and decided to go to England, and there study the locomotive where alone it could be found in operation. But before he sailed, on the recommendation of its Chief Engineer, Mr. John B. Jervis (who also still survives), the company had determined to commission Mr. Allen to select the designs for and order three locomotives in England. This commission he executed early in the summer of 1828, and this Mr. Allen believes to have been the first order given for a locomotive after those built for the Stockton & Darlington Railroad.

Although the engines on the last-named road served their purpose effectively, it had become evident that it would be a very great advantage if within the limits of the practicable weight a more rapid production of steam could be had, and Booth, of the Liverpool & Manchester road (then under construction), had proposed a multitubular boiler, and Rastrick, of Stourbridge, a many-flued boiler, the prototype of the present locomotive boiler. The proper type of boiler was the question of the day among engineers, and as it had been left to Mr. Allen's discretion to select the plan of the locomotives to be ordered, it naturally received his careful consideration. He seems to have been convinced by the arguments of Rastrick, but unwilling to depend solely upon what was then wholly untried, he ordered two locomotives of Stephenson and one of Foster, Rastrick & Co., understanding that the latter should have a flue boiler, according to Rastrick's design. The other two locomotives, as Mr. Allen says, "were identical in boiler, engines, plan and appurtenances with the 'Rocket.'" For some reason, however, the locomotive sent up the canal and tried at Honesdale in August, 1829, was not a Stephenson engine, but Foster, Rastrick & Co.'s "Stourbridge Lion." Otherwise, the performance which astonished the world at Liverpool in October, 1829, might have been exhibited two months earlier on the other side of the Atlantic, where

two such locomotives had been waiting ever since winter for an opportunity to show their capacity.

Strange to say, no one seems to know what became of these two Stephenson locomotives. The Rastrick engine, we know, was found too heavy for the railroad it was made for. Perhaps their weight disqualified the Stephenson engines for the service also, and prevented their trial.

In the concluding part of his narrative, to be published next week, Mr. Allen describes his trial trip with the "Stourbridge Lion"—the first movement of a locomotive over a railroad in America, and a notable era in the history of the country.

A bill has been pending in the Connecticut Legislature, and has now passed the lower House, prohibiting a higher charge for a shipment to any station than is charged for a similar shipment from the same point of shipment to a more distant station, and the advocates of the law adduced as evidence of its reasonableness the long existence of a similar law in Massachusetts. Opponents of the bill claimed that the Massachusetts law has been a dead letter. The Massachusetts Railroad Commissioners, however, have expressed a different opinion, and it is said that the general understanding in Massachusetts is that the law is universally observed by the railroad companies—so generally, at least, that very few complaints are made of its violation.

The "short-haul" law of Massachusetts provides that "no railroad corporation shall charge or receive for the transportation of freight to any station on its road a greater sum than is at the time charged or received for the transportation of the like class and quantity of freight from the same original point of departure to a station at a greater distance on its road in the same direction." And the same provisions are made to apply to two or more connecting roads. The penalty for violation of the law, in addition to liability for damages, is two hundred dollars, to be recovered by the party aggrieved.

Of late years there has been no complaint of violation, except one against the New York & New England for charging more for the transportation of coal from Norwich to Webster than from Norwich to Worcester. This complaint was heard by the Railroad Commissioners in 1882 (Fourteenth Annual Report, p. 32), who found that the railroad company was violating the law, and the company then complied with the decision of the Commissioners by fixing the same rate (\$1 per ton) to Webster as to Worcester, a rebate of ten cents being allowed to shippers of large quantities. The result of this compliance, as stated by the late President of the New York & New England Railroad Company, was the loss of some \$35,000 to the corporation; which, of course, is proof that the law is not a dead letter in Massachusetts. But it is not by any means probable that all cases of violation of the law would be complained of, because in many the result of its enforcement would be more likely to be an advance of the rates to the station having the low rate, even at the cost of sacrificing all the business to that place, rather than a reduction at the other places; while in very many cases of through shipments the public is not familiar with the rate actually received by the Massachusetts road for the haul over its line.

But, whether obeyed or not, the law is absolutely irrational, and there are many places in this country where its application would make it necessary for a railroad to give up a very large part of its traffic entirely. It is based on the idea that a railroad should not make a larger profit on one shipment than on another that costs it less to carry, which is just as reasonable, and no more so, as a requirement that it shall make the same rate of profit on all traffic. A striking instance illustrating the irrationality of the law we have related before. Some oystermen in Delaware had an unsatisfactory outlet for their oysters. The freight agent of the local railroad agreed to run a refrigerator car as an experiment, but feared that their shipments would not be enough to pay the expense. So it proved. The oystermen were delighted with the service and satisfied with the rate charged them. Finding the car no paying expenses, the freight agent solicited shipments from Norfolk, whence immense quantities were shipped to the same markets by other routes at much lower rates than were charged the Delaware men. To secure Norfolk shipments by the Delaware road a rate was made but one-half or one-third the rate charged for Delaware shipments going to the same place a shorter distance over the same road. But in this way shipments enough were secured to make the refrigerator car pay, and the Delaware oystermen, knowing that the Norfolk shipments alone made it possible to give them the much-desired accommodation, were



entirely satisfied that they should be taken at a rate as low as was necessary to secure them.

The cases similar to this may be counted by the thousands, though there are not many where the shippers themselves see so plainly the necessity of charging them more for a short distance than others for a long one. The fact that for shipments to or from certain stations a railroad for some reason cannot collect as much as fair and reasonable rates which it charges for shorter distances to or from other stations is not a reason why it should be compelled either to give up the traffic of that station or reduce its fair and reasonable rates at other stations.

The law is an attempt to regulate by a general rule what cannot be regulated justly by a general rule; and all efforts to regulate rates—that is, to decide what are extortionate or unjustly discriminating rates—that do not rest the final decision with trained intelligences which may consider all the facts in each case and decide it on its merits are bound to fail. They may be executed, but they will not prevent the evils aimed at, and they will prevent practices which are for the public good.

February earnings are given in the large table published this week for 75 railroads, whose aggregate length was 49,935 miles this year and 9.6 per cent. more than last year. The aggregate earnings of these roads were \$22,073,689 and 4.2 per cent. more than last year, and their average earnings per mile decreased from \$465 to \$442, or 5 per cent. As there was one day more in the month this year than last we shall get a more correct idea of the course of the business by comparing the earnings per mile *per day*, which decreased from \$16.61 last year to \$15.24 this year, or 8½ per cent.

Of the 75 roads reporting 25 show a decrease in total earnings, and 36 a decrease in earnings per mile. Among the largest of the latter are 18 per cent. by the Northern Central, 27½ by the Lexington & Big Sandy, 24½ by the Columbia & Greenville, 28½ by the Cincinnati, Indianapolis, St. Louis & Chicago, 33½ by the Canadian Pacific, and 26½ by the Little Rock, Mississippi River & Texas. There are some large increases, but mostly on roads which had extremely light earnings last year and light ones this year in spite of their great gain. Thus, while the average earnings per mile this year were \$442, the Rochester & Pittsburgh, after gaining 66 per cent., earned \$272 per mile; and other similar gains are: New Orleans & Northeastern, 57 per cent., to \$199; Shenandoah Valley, 53½, to \$238; Western North Carolina, 20, to \$175; Peoria, Decatur & Evansville, 24½, to \$223; Des Moines & Ft. Dodge, 26, to \$197; Wisconsin Central, 22, to \$243; Fort Scott & Wichita, 193, to \$258. The only large gains by roads with anything like average earnings per mile were 23 per cent. on the Chicago & Grand Trunk, to \$693, and 65 per cent. on the St. Louis & San Francisco, to \$440.

The results in the different geographical districts may be seen on the table. The four roads northwest of St. Paul all suffered a decrease in earnings per mile. All the other roads northwest of Chicago had an increase in total earnings, and 10 of the 12 an increase in earnings per mile over last year, when their earnings were very bad. The roads west and southwest of St. Louis show a large gain on the whole, but most of it is made by roads in Kansas and Missouri. The absence of the Gould lines, the chief roads of this section, robs this statement of most of its significance. The roads east of the Mississippi and north of the Ohio show a considerable decline, as for some months previous, and none of them, except three lines in Michigan, can be said to have done well. South of the Ohio, and the Potomac gains are rather more numerous than losses, which is surprising, and in the aggregate there is a slight gain. East of Ohio considerable losses are reported by the Northern Central, the Pennsylvania, and the Reading, which have about three-fourths of the aggregate earnings of the Eastern roads reporting.

For the two months ending with February the 76 roads reporting, having 50,067 miles of road and 9.4 per cent. more than last year, earned \$45,408,334, which is 2 per cent. more than last year, and their average earnings per mile decreased from \$973 to \$907, or 6½ per cent.

The earnings and expenses of the Pennsylvania Railroad in February including all lines east of Pittsburgh and Erie, were as follows this year and last:

	1884.	1883.	Decrease.	P. c.
Gross earnings.....	\$3,428,713	\$3,712,195	\$283,482	7.6
Expenses.....	2,304,154	2,375,521	73,367	3.9
Net earnings.....	\$1,124,559	\$1,336,674	\$212,115	15.7

The decrease in gross earnings is less than in January, and the decrease in expenses is a little greater, and the decrease in net earnings is about \$100,000 less, but is still considerable.

For 12 successive years the earnings and expenses in February have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1873.....	\$2,685,295	\$2,145,165	\$540,130
1874.....	2,517,980	1,716,881	801,099
1875.....	2,166,815	1,452,163	714,652
1876.....	2,345,792	1,881,104	464,688
1877.....	2,165,089	1,461,646	703,443
1878.....	2,169,009	1,418,009	744,900
1879.....	2,538,039	1,365,053	1,172,987
1880.....	2,044,575	1,712,394	1,232,182
1881.....	3,095,594	1,937,510	1,158,084
1882.....	3,306,730	2,227,129	1,079,601
1883.....	3,712,195	2,375,521	1,336,674
1884.....	3,428,713	2,304,154	1,124,559

Thus the gross earnings and working expenses were larger this year than in any previous February except last year, but the net earnings were smaller than in 1879, 1880 and 1881 as well as 1883. The fact that February had 29 days this year should not be forgotten, as it adds nearly ¾ per cent. to earnings and expenses, and but for it the gross earnings would have been about \$118,231 and the net earnings \$38,778 less, and the decrease from last year would have been 10½ per cent. in gross and 18½ in net earnings.

The lines west of Pittsburgh and Erie have shown the following surplus or deficit after meeting all liabilities for rentals, interest, etc., in February, for the last six years:

1879.	1880.	1881.	1882.	1883.	1884.
Deficit.	Surplus.	Surplus.	Deficit.	Deficit.	Deficit.
\$35,730	\$116,710	\$165,022	\$100,197	\$98,526	\$150,041

These amounts, in comparison with the total net earnings of this great system of roads, are inconsiderable, but the deficit this year is a little larger than in last year and the year before. Last year February was unfavorable on account of the floods, and it was this year also. Taking the two systems together the net earnings of the Pennsylvania Railroad plus the profit or loss on this western system have been:

1879.	1880.	1881.	1882.	1883.	1884.
\$1,137,257	\$1,348,892	\$1,321,104	\$979,494	\$1,338,138	\$974,518

Thus the profit of the company from the two systems was less this year in February than in any other of the six (though nearly the same as in 1882) and was \$263,630 (21½ per cent.) less than last year, and 28 per cent. less than in 1880.

For the two months ending with February, for 12 successive years, the earnings and expenses of the lines east of Pittsburgh and Erie have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1873.....	\$5,430,579	\$3,339,817	\$1,090,762
1874.....	5,375,145	3,454,370	1,920,775
1875.....	4,457,154	3,082,930	1,274,224
1876.....	4,793,477	3,502,864	1,290,613
1877.....	4,549,265	3,117,989	1,431,276
1878.....	4,559,306	2,936,107	1,623,199
1879.....	5,081,463	2,888,945	2,192,518
1880.....	6,028,126	3,429,046	2,599,080
1881.....	6,328,809	3,919,864	2,364,545
1882.....	6,650,051	4,523,194	2,126,857
1883.....	7,641,552	4,833,820	2,807,732
1884.....	7,000,946	4,710,251	2,290,695

Compared with last year there is a decrease of \$640,606 (8½ per cent.) in gross earnings of \$123,569 (2½ per cent.) in working expenses, and of \$517,037 (18½ per cent.) in net earnings. Gross earnings and expenses were larger this year than ever before, but the net earnings were exceeded in 1880 and 1881 as well as 1883.

The surplus or deficit of the lines west of Pittsburgh and Erie for six years has been:

1879.	1880.	1881.	1882.	1883.	1884.
Surplus.	Surplus.	Surplus.	Deficit.	Surplus.	Deficit.
\$125,897	\$425,014	\$546,329	\$57,449	\$123,274	\$250,607

Adding this to the net earnings of the lines east of Pittsburgh and Erie for the two months, we have the following as the profits of the company from the two systems:

1879.	1880.	1881.	1882.	1883.	1884.
\$2,318,415	\$3,020,494	\$2,911,174	\$2,006,418	\$2,684,458	\$2,034,088

Thus the profit has been less this year than in any of the others, though the capital (chiefly the stock) on which interest is to be paid, has increased immensely in these six years. The decrease of \$634,370 from last year is equal to nearly 0.7 per cent on the present share capital, and a continuation of the decrease at this rate throughout the year would amount to more than a 4 per cent. dividend on the stock.

The depression in the iron and other business is thus beginning to tell decidedly on this company, which, though it has largely increased its capital since 1880, has added comparatively a small amount to its mileage, the expenditures going very large into improvements of its road and additions to its rolling stock.

The recent reduction of east-bound rates below profitable figures has led many to speak of the virtual destruction of the trunk-line pool. But the organization of the railroads is certainly in a much better condition now than before the reduction was made. It has exercised its power in an effective way, and we suspect that nine-tenths of the irregularities of the past nine months would have been prevented had this power been exercised in the same way last July or August. Meanwhile west-bound rates are well maintained except at Boston, where irregularities are chronic; the trunk-line pool proper divides traffic and

distributes money balances regularly; the passenger pool does the same; and if east-bound rates are unprofitably low, they are at least uniform, and nearly all the companies are very eager to have them advanced. Very likely an advance from 15 to 20 cents will be made before navigation opens, as there is great fear that if the 15-cent rate is kept till then it will establish lake and canal rates so low that an advance of rail rates later would prevent shipments. There is something in this, but, we think, not a great deal. The vessel owners will be quite as willing as the railroads to advance their rates if circumstances make it possible. There is an unusually large stock in store at western lake ports which even the present large shipments cannot seriously reduce before navigations opens, and if there is a demand for it the vessels will have plenty to do for a few weeks at least. But it will be better to have a 15-cent rate all summer, if that is necessary to secure the keeping of the agreements the companies have made. It does not now seem necessary; the medicine they have taken they have found very nauseous; and, if they are convinced that it will be administered again promptly whenever the disease breaks out, they are likely to take pretty good care of their health.

It is remarkable that at a time when there is general complaint of dull business the shipments from New York to the West should be so large as they have been during the past winter. In January they were about 10 per cent. more than last year, in February 25 per cent., and for the first three weeks of March 8 per cent. more than last year; and the shipments this year have been larger than in any previous year except 1882, when rates were nominal. West-bound rates are well maintained from New York, but there is some trouble, as usual, at Boston.

It was not more than two or three years ago that every few days a telegram was published in all the daily newspapers announcing that Vanderbilt and Gould were both trying to secure the Burlington & Ohio River Railroad, which then had advanced little further than the surveys. Now it was Vanderbilt and now it was Gould that was said to have the best chance to get the prize. The latest telegram concerning the road, dated March 18 last, is of another color. "The Burlington & Ohio River road was sold at auction by the Master in Chancery to-day to H. S. Hopkins, of St. Louis. The amount of his bid was \$13,700." We had always supposed that the reason why neither Gould nor Vanderbilt got the road that both wanted so badly was that neither could raise money enough. To be sure one of these gentlemen when interviewed on the subject in Chicago intimated that he had never heard of the road and would not take it as a gift; but we know how it is with men who want to buy: they are very sure not to say anything favorable of the property they want until they have got it. Some one may intimate that the promoters of the enterprise circulated the reports about the great desire of Gould and Vanderbilt to get the road in order to help themselves to raise money on its securities or get credit for materials; but there always are some who are ready to malign those who are engaged in "developing the resources of the country." This particular resource is said to have been developed far enough to absorb \$200,000 of somebody's money, now represented by 35 miles of road-bed and bridging and four miles of steel rails. It was very heartless of Gould and Vanderbilt not to have bid as much as \$14,000 for what they wanted so badly two years ago as to lead some one to spend \$200,000 on it. We fear that the Master in Chancery neglected to send them notice of the sale. Some one ought to have attended to this.

Chicago through rail shipments eastward for the week ending March 22, by the complete report, have been as follows for five successive years:

	1880.	1881.	1882.	1883.	1884.
Tons.....	75,430	55,486	38,646	60,308	55,947

Thus the shipments this year were 13,421 tons (19 per cent.) less than last year, 17,301 more than in 1882, nearly the same as in 1881, and 19,422 tons less than in 1880, when they were among the largest ever made. Though so much less than in 1880 and 1883 the shipments this year may fairly be called large. For four days of it the regular rate on grain and flour to New York was 20 cents per 100 lbs., and for the other two 15 cents, against 30 cents last year, 20 in 1882, and 25 in 1881 and 1880. Thus the earnings from this freight were about as follows:

1880.	1881.	1882.	1883.	1884.
\$528,073	\$388,402	\$154,584	\$416,208	\$205,140

This makes the earnings from the business this year but half as great as last year, but one-third more than in 1882. The two new roads take 19 per cent. of the business this year, however, and the earnings of the old ones are thus diminished in that proportion. The decrease must take away very nearly the whole of the profit.



The percentage of the total shipments carried by each road this year and last was:

	1884.	1883.		1884.	1883.
C. & Grand T.	14.8	14.5	Fort Wayne	19.2	23.5
Mich. Cen.	10.8	20.4	C. St. L. & P.	4.2	13.0
Lake Shore	16.3	17.9	Balt. & Ohio	6.8	4.7
Nickel Plate	14.4	14.4	Chic. & Atlantic	13.5	13.5

Thus the three Vanderbilt roads together earned 41.5 per cent. of the whole this year, while two of them carried 44.3 last year; and the two Pennsylvania roads, which carried 36.5 per cent. last year had but 23.4 this. The three new roads that have entered the field since 1880 carried 42.7 per cent. of the whole this year, while entitled by award to about 35 per cent. (The turning of the National Despatch from the Michigan Central to the Chicago & Grand Trunk adds about 5 per cent. to the latter's proportion.) Either one of them carried twice as much as the Baltimore & Ohio, which has been ten years in Chicago.

For seven successive weeks the Chicago shipments have been:

	Week ending—				
Feb. 9.	Feb. 16.	Feb. 23.	March 1.	March 8.	March 15.
41,874	38,732	45,014	37,778	42,402	47,135
					53,947

There is a material increase since rates were reduced, but not nearly in proportion to the reduction, for at the regular rates the shipment of the first week of March (all 30 cents) would have produced \$254,772, those of the second week (two days of the 20-cent rate) about \$251,387, and those of the third week (two days of the 15-cent rate) \$205,139, even when we estimate that the daily shipments under the reduced rate were no larger than in the same week under the higher rate. At the 30-cent rate the gross earnings in the third week of March would have been produced by shipments of 34,190 tons—less than in any week this year; and, of course, there has been some increase of expenses attending the larger shipments. It is probably best, however, that the business should be made entirely unprofitable until there is some assurance of a reasonable conduct of the business and maintenance of agreements entered into.

For the week ending March 29 the incomplete returns made to the Chicago Board of Trade of eastward shipments, through and local, of flour, grain and provisions, gives a total of 70,218 tons, against 48,092 tons in the corresponding week of last year, and 54,357 tons in the previous week of this year. These are very large shipments, and are evidently the effect of the 15-cent rate, which was in effect the whole of this week, but of only two days of the week before, and of the great fall in the price of wheat, which encourages purchasers for export and for Eastern consumption. Of the shipments of last week 12,293 tons were flour, 53,232 grain and 4,643 provisions—the latter a very small amount, and 40 per cent. less than last year. The week before 12,247 tons were flour, 37,903 grain and 4,208 provisions. Thus substantially the whole increase was grain. The percentages of the total by each route were 9.3 by the Chicago & Grand Trunk, 11.7 by the Michigan Central, 15.5 by the Lake Shore, 14.1 by the Nickel Plate, 14.5 by the Fort Wayne, 5.6 by the Chicago, St. Louis & Pittsburgh, 14.3 by the Baltimore & Ohio, and 15 by the Chicago & Atlantic. As local freight is included, these are not the pool percentages, but on roads with light local traffic, like the Grand Trunk, the Nickel Plate, the Baltimore & Ohio and the Chicago and Atlantic are probably considerably less than their percentages of the through freight, notwithstanding which these four roads carried 52.7 per cent. of all the freight while entitled to about 42 per cent. of the through freight.

The effect of the reduced rates on shipments is shown below by the figures showing the shipments of wheat, corn and oats from the principal Western markets for successive weeks, in bushels:

	March 8.	March 15.	March 22.	March 29.
Wheat	292,600	378,360	515,030	1,057,720
Corn	1,569,630	2,140,650	1,903,130	1,822,100
Oats	666,075	753,100	736,975	1,309,560
Total	2,528,305	3,272,110	3,155,135	4,189,380

The reduction from 30 to 20 cents was made on the 13th, and that from 20 to 15 on the 20th. The first one seems to have had little effect on anything, but the shipments of wheat last week, which were all made at the 15-cent rate, were three times as great as when the 30-cent rate was in force, and the shipments of oats twice as great. The corn shipments seem to have been but little affected. The increased wheat shipments can hardly be called large, however, and at this rate comparatively a small part of the large stock in store will have been forwarded when lake navigation opens.

At the seven leading western packing points the numbers of hogs packed during the four months of the winter season, Nov. 1 to Feb. 29, inclusive, was as follows this year and last:

No. hogs packed:	1883-84.	1882-83.	Inc. or Dec.	P. c.
Chicago	2,611,384	2,557,823	Dec. 546,459	21.4
Kansas City	427,102	445,374	Dec. 18,212	4.1
St. Louis	382,222	327,004	Inc. 55,218	17.0
Cincinnati	365,451	425,400	Dec. 59,949	14.0
Indianapolis	274,095	276,017	Inc. 1,922	0.7
Milwaukee	265,467	193,510	Dec. 72,043	9.5
Louisville	141,704	125,812	Inc. 15,892	12.6
Totals	3,867,485	4,450,940	Dec. 583,455	13.1

There was thus a large increase at St. Louis, but this was much more than counterbalanced by the large decrease at Louisville and Cincinnati and the very large decrease at Chicago, so that in the aggregate there was a decrease of 13 per cent. But the production this year is not only less than last, but is the smallest since 1877. For 10 successive years the numbers packed at these seven places have been:

Year.	Hogs packed.	Year.	Hogs packed.
1874-75	3,575,311	1879-80	4,769,234
1875-76	3,288,122	1880-81	5,063,087
1876-77	3,407,103	1881-82	4,118,978
1877-78	4,753,017	1882-83	4,450,940
1878-79	5,416,180	1883-84	3,867,485

The number packed is thus but 8 per cent. greater than nine years ago, and is 18½ per cent. less than six years ago.

These places, however, do not pack all the hogs, but they have generally packed about 70 per cent. of them, and in 1882-83 packed 72½ per cent. At Chicago, the number is the smallest since 1876-77; at Cincinnati, smaller than in any year since 1871, at least (in 1871 it packed 656,841, against 865,451 this year); St. Louis packed fewer than in any other year since 1871, except 1875-76, 1881-82, and 1882-83; but Kansas City packed more than in any previous year except last year, and twice as many as in any year previous to 1880-81.

But the figures for the number of hogs packed do not show the full amount of the decrease, for the average weight was 7 per cent. less than last year, making the decrease equivalent to full 19 per cent. The decrease in weight was equal to the average, but it was much more at Milwaukee (16½ per cent.), Louisville (10 per cent.), and Indianapolis (10½ per cent.); but at Kansas City there was a trifling increase, due doubtless to the good crops of sound corn in Kansas.

It is, perhaps, the very large and long continuing decrease in pork production that has kept up the prices of beef cattle so well. It is very rare that in this country there is such a decline in leading products; but probably two or three really good crops of corn would go far toward making the production of fat hogs as great as ever before.

In 1880 the production of Bessemer steel in this country exceeded that in Great Britain slightly, but in every year since the production has been the larger in Great Britain—in 1881 5 per cent., in 1882 10½ per cent., and in 1883 5 per cent. As our great consumption of steel rails was in 1881 and 1882, this might seem strange, but in fact we have all the time produced more Bessemer rails than England—15 per cent. more in 1880, 16 per cent. in 1881, 4 per cent. in 1882, and 4½ per cent. last year.

The difference is that the consumption for other purposes than rails is large in England and small here, though a considerable part is due to exports of ingots from England to be rolled into rails in this country.

The excess of ingots over rails produced in the two countries has been:

	1880.	1881.	1882.	1883.
Great Britain	304,472	417,979	437,864	456,236
United States	222,066	186,477	230,620	328,636

In 1881 86 per cent. of our production of imports went into rails; in 1883, 78 per cent.; the largest proportion that has gone into rails in Great Britain was 74 per cent., in 1882; in the other three years it has varied only between 70½ and 71 per cent.

The production of Bessemer rails decreased about the same in Great Britain as in the United States from 1882 to 1883—135,358 tons (12½ per cent.) here, and 138,611 (11½ per cent.) there, and the production in the two countries has kept pretty even pace since 1879, as shown below:

	1880.	1881.	1882.	1883.
United States	832,196	1,187,770	1,284,067	1,148,709
Great Britain	739,910	1,023,740	1,235,765	1,097,174

The production in the United States excludes that from imported blooms.

From 1880 to 1883 there was an increase of 296,513 tons (34½ per cent.) in the United States, and of 357,264 tons (48 per cent.) in Great Britain. In both countries the maximum production was in 1882, when it was 51 per cent. more here and 64 per cent. more there than in 1880. As this country was the chief customer for British rails until last year it is somewhat remarkable that its production did not fall off more in 1883, when we took very little thence.

We copied recently a telegram from a Texas paper describing a case of train-wrecking, and saying that the wrecker had been arrested, and that "that there is some fear of his being hung by a mob." A correspondent returns us the paragraph with the word "fear" underscored, and writes: "I seriously object to the use of the marked word in the article, and think the word 'hope' would much more nearly express the feelings of the traveling public. We do (very occasionally) hang a man who commits a single murder, but who can remember an instance of the hanging of a wretch who commits a wholesale murder? Attempts—successful or otherwise—to wreck passenger trains are of almost daily occurrence, and though I am not an advocate of Lynch law generally, I believe that the only remedy for this greatest of all crimes is a swift and sure death at the hands of an outraged people. Failing this, can we not have some special legislation in this matter?"

We have nothing to say in mitigation of the crime of train-wrecking, and we are willing to endorse the proposed change from "fear" to "hope" on condition that one more change be made—from "mob" to "law." We should fear to have even a train-wrecker hung by the mob; we might hope to have him hung by the law. Probably no new legislation is required for this in cases where death is caused by the wreck; but it might be well to have the wrecking of a train made a capital offense, without regard to the injury caused to persons, as setting fire to a building in which people are living is (or was) a capital offense in some states. It is the administration of the law rather than the law itself that is defective, however.

Mr. G. M. Thompson, formerly an officer of the Mexican Central Railroad, was reported in our personal column two weeks ago to have died recently at his home in Wakefield, Mass., of quick consumption. Mr. Thompson writes to us from Wakefield and assures us that this is a mistake. As this is the second time that he has seen the report circulated he thinks that some one has set it going with malicious intent. Our authority for the statement was the Mexican

*Two Republics*, of March 6; the same journal, in its issue of March 9, said that Mr. Thompson's friends in Mexico had not received notice of that event, and that it was hoped that the report was unfounded; and by this time, probably, there as well as here, it has become known that Mr. Thompson is alive and ready for work.

#### Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

*Cape Fear and Yadkin Valley*.—Extended from Rockfish, N. C., southwest to Lumber River, 16 miles.

*Detroit, Mackinac & Marquette*.—Track laid from Marquette, Mich., westward to Negaunee, 12 miles.

*Vicksburg, Shreveport & Pacific*.—Extended from Arcadia, La., west to Bayou Danchitte, 24 miles.

This is a total of 52 miles of new railroad, making 386 miles reported to date for 1884. The total track reported laid to the corresponding date for 12 years is as follows:

	Miles.		Miles.
1884	386	1878	242
1883	386	1877	190
1882	1,358	1876	304
1881	682	1875	138
1880	887	1874	246
1879	317	1873	472

These statements include main track only, no account being taken of second tracks or other additional tracks or sidings.

#### NEW PUBLICATIONS.

*Pocket Logarithms to Four Places*. New York. D. Van Nostrand, 1883.

The use of four-place logarithms might well be more extended than it is, as they are amply accurate for all the ordinary calculations of the engineer and surveyor and very much easier to use. The annoyance of using six and seven-place decimals has much to do, probably, with the reluctance of many to use logarithms at all; and this is the mere to be regretted as the labor of using the additional decimals is, in the main, wholly thrown away, especially in the case of six-place logarithms, which are more troublesome than either five or seven-place, owing to the differences between the successive logarithms being so large as to make interpolation difficult.

With four-place logarithms,  
The log. of 98.50 is 1.9934,  
" " 98.51 or 2 is 1.9935,  
" " 98.53 or 4 is 1.9936, etc.

Thus, we are liable to an error of only about one-half unit in the last digit, or say 0.005 foot in 100, a matter of no moment in ordinary engineering and surveying.

The typographical style of the volume, an important matter in a book of tables, is not wholly commendable. The page is too small and the number of pages correspondingly too large. Tables only one-tenth as large, with columns of differences for interpolations would have been preferable. Still, they are handy for those who use logarithms.

#### Foreign Railroad Notes.

The wages and salaries of employes of German railroads for the last two years reported varied from 20½ per cent. of the total expenses on the Halle, Sorau & Guben Railroad to 34.3 per cent. on the Palatinate Railroad.

On the railroads of the German Empire during the two years last reported (ending with March, 1882), the number of persons killed or injured (excluding suicides) to every million of train miles varied from 3.49 on the Oldenburg State Railroad to 28.54 on the Right Shore of Oder road.

The force employed upon the 9,001 miles of Prussian State railroads in 1882-83 numbered 157,531, of whom 62,986 were regularly enrolled in the state railroad service, and 94,545 were laborers. This force is at the rate of 17.5 per mile of road. The average yearly pay was a little less than \$195. It is estimated that these employes and those dependent on them for support amount to more than 2 per cent. of the whole Prussian population.

The negotiations for the acquisition of the Berlin & Hamburg Railroad by Prussia are not yet concluded. Another year of the company has passed, and the dividend for 1882, not previously determined, has been decided to be 19½ per cent. This being higher than the average of the years on which the government offer was made, a new proposition has been made by the administration to purchase on the basis of a yearly interest of 16½ per cent., besides a cash payment at once of 60 marks (\$15) per share.

The Russian railroads had their largest earnings per mile in 1878, when they amounted to \$12,625—in paper money however—per mile. They have fallen off since, and in 1880 were but \$10,289 per mile. But there has been scarcely any reduction in the working expenses, and the government which guarantees certain dividends, has been called upon for larger and larger payments. These amounted to \$733 per mile in 1868, but rose to the formidable amount of \$2,806 in 1880.

The Prussian Minister of Public Works gives notice that at his suggestion His Imperial and Royal Majesty, by order of Jan. 30, has been pleased to approve a change in the uniform of roadmasters, so that in place of the black cloth heretofore prescribed for the collar and cuffs of the coat, and likewise for the band of the uniform cap, hereafter black velvet shall be used; that on the gold laced collar



besides two gold stars a wheel with a pair of compasses shall be attached. The minister notes that this regulation will also apply to the summer uniform.

Greece has granted a concession and a subsidy to a French company, which has begun work, for a railroad from Piræus, the port of Athens, along the north coast of the Gulf of Athens westward by way of Eleusis and Megara, then through the Isthmus of Corinth through Corinth and south of the Gulf of Corinth to Patras, in ancient Achæa, at the head of a bay on the west coast, about 150 miles in all, including some branches. About 2,500 years ago this would have been very convenient for Athenians attending the Olympian games. Another railroad is under way in the territory recently acquired from Turkey, from Volo westward, some 55 miles.

In discussing the railroad estimates in the Prussian Diet last January, attention was called to a statement of the standard rates, which were seen to be materially different on different lines of the state system. The Committee on the Estimates recommended that the administration be requested to submit a statistical statement showing what would be the financial and economical effects of the removal of the existing inequalities in the standard rates. In the opinion of the Committee this would be a preliminary step toward an equalization of differences which seemed to it necessary in the interest of justice. This movement had its origin in a similar resolution of the National Railroad Council, which is an advisory body, established by law, of representatives of shippers.

The Minister of Public Works said in regard to this that to remove existing irregularities would require very thorough investigation, and especially a knowledge of the field in which the standard rates were to be introduced. This could not occur until the whole district in which they were to apply was in the hands of the state. Then the subject must be considered on the economic side. Since the lowest rates which may be in effect anywhere could not be applied everywhere, and therefore to make them uniform there would have to be advances in some places, this preliminary study is especially necessary.

#### Securities Owned by the Pennsylvania Railroad Co.

The following is a list of the stocks and bonds of other companies owned by the Pennsylvania Railroad Co. on Dec. 31 last, as given in the annual report of the company for 1883:

BONDS.	Par value.
Alexandria & Fredericksburg, first mortgage, 7 per cent.	\$1,000,000
Allegheny Valley Railroad funded debt mortgage, 7 per cent.	5,314,000
American Bottom Marble, Lime & Coal Co., 7 per cent. gold.	150,000
Baltimore & Potomac, second mortgage income, 7 per cent.	2,000,000
Bedford & Bridgeport, first mortgage, 7 per cent.	1,000,000
Bell's Gap Railroad first mortgage, 7 per cent.	15,000
Bell's Gap Railroad consolidated mortgage, 6 per cent.	8,500
Burlington County Railroad first mortgage (Vincennes Branch), overdue, 6 per cent.	15,000
Boliviere Delaware consolidated mortgage, 7 per cent.	1,239,000
Columbia & Port Deposit first mortgage, 7 per cent.	1,822,000
Central Stock Yard & Transit Co. first mortgage, 7 per cent.	300,000
Chicago, St. Louis & Pittsburgh consolidated mortgage, 5 per cent.	4,066,000
Cincinnati & Muskingum Valley first mortgage, 7 per cent.	752,600
Cincinnati street connection.	110,000
Cleveland & Pittsburgh construction and equipment, 7 per cent.	473,000
Cresson Springs Co. first mortgage, 6 per cent.	100,000
East Brandywine & Waynesburg first mortgage, 7 per cent.	125,600
East Brandywine & Waynesburg, New Holland extension, 7 per cent.	194,500
Frederick & Pennsylvania Line first mortgage, 6 per cent. gold.	92,000
Freehold & Jamesburg Agricultural consolidated mortgage, 6 per cent.	173,000
Girard Point Storage Co. first mortgage, 5 per cent.	593,000
Indianapolis & St. Louis 30 years, 6 per cent. gold bonds.	500,000
Jeffersonville, Madison & Indianapolis first mortgage, 7 per cent. bonds.	326,000
Jersey City & Bergen first mortgage, 7 per cent.	356,000
Junction Railroad second, 6 per cent.	2,000
Lewisburg & Tyrone certificates of indebtedness, 6 per cent.	200,000
Mifflin & Centre County first mortgage, 6 per cent.	200,000
North & West Branch first mortgage, 6 per cent.	1,400,000
Orange & Newark Horse-Car Railroad consolidated mortgage, 6 per cent.	358,000
Pennsylvania Schuylkill Valley first mortgage, 5 per cent.	2,700,000
Pennsylvania Canal Co. first mortgage, 6 per cent.	469,000
Perth Amboy & Woodbridge first mortgage, 6 per cent.	100,000
Philadelphia & Erie general mortgage, 5 per cent. registered.	263,000
Philadelphia & Erie 6 per cent. coupon.	3,680,000
Philadelphia & Long Branch first mortgage, 5 per cent.	750,000
Pittsburgh, Cincinnati & St. Louis consolidated mortgage, 7 per cent.	500,000
Pittsburgh, Virginia & Charleston first mortgage, 5 per cent.	3,000,000
Pittsburgh, Wheeling & Kentucky first mortgage, 7 per cent.	89,000
Ridgway & Clearfield first mortgage, 5 per cent.	375,000
Shenandoah Valley general mortgage, 6 per cent.	32,000
Shamokin Valley & Pottsville first mortgage, 7 per cent.	685,000
Southwest Pennsylvania first mortgage, 7 per cent.	725,000
St. Louis, Vandalia & Terre Haute second mortgage, convertible, 7 per cent.	225,000
Summit Branch first mortgage, 7 per cent.	500,000
Susquehanna & Clearfield first mortgage, 5 per cent.	240,000
Sunbury, Hazleton & Wilkesbarre first mortgage, 5 per cent.	113,000
Sunbury, Hazleton & Wilkesbarre income, 6 per cent.	488,600
Trenton Horse-Car Railroad, 7 per cent.	5,400
Tyrone & Clearfield first mortgage, 5 per cent.	1,000,000
Warren & Franklin first mortgage, 5 per cent.	535,500
Western Pennsylvania (branch), 6 per cent.	284,700
Western Pennsylvania first mortgage, 6 per cent.	10,000
Western Pennsylvania consolidated mortgage, 5 per cent.	2,500,000
<b>Total bonds.</b>	<b>\$42,123,800</b>

STOCKS.	Par value.
Allegheny Valley Railroad.	\$1,250,000
American Steamship Co.	900,000
Bald Eagle Valley.	425,800
Baltimore & Potomac.	3,042,600
Bell's Gap Railroad.	23,550
Bellefonte, Nittany & Lemont, installment.	5,050
Chartiers Railway.	327,350
Cleveland, Mount Vernon & Delaware common.	1,100,000
Camden & Philadelphia Steamboat Ferry Co.	33,300
Columbus & Xenia.	519,550
Camden & Atlantic preferred.	451,950
Camden & Atlantic common.	234,100
Connecting Railway.	1,277,550
Cresson Springs Co. preferred.	50,000
Cresson Springs Co. common.	182,150
Cumberland Valley common.	975,800
Cumberland Valley preferred.	237,200
East Brandywine & Waynesburg.	900
Frederick & Pennsylvania L. & E. preferred.	461,000
Flemington Railroad & Transportation Co.	33,900
Freehold & Jamesburg Agricultural.	15,750
Germantown, Norristown & Phoenixville.	149,100
Girard Point Storage Co.	1,063,700
Keystone Hotel Co.	76,650
Lewisburg & Tyrone.	100,000
Lewisburg & Tuscarora Bridge Co.	1,112,400
Little Miami.	1,060
Lock Haven & Clearfield, installment.	600,500
Louisville Bridge Co.	25,000
Long Beach Railroad, installment.	901,300
Mineral Railroad & Mining Co., installment.	100,000
Masillon & Cleveland.	33,334
Milford & Bay Shore.	62,500
Martin's Creek & Stroudsburg, installment.	50,625
Moshannon & Clearfield, installment.	20,000
New Jersey Warehouse & Guarantee Co.	10,000
Northern Central.	500,000
North & West Branch.	3,020,700
Northwestern Ohio.	925,000
Pennsylvania Schuylkill Valley.	1,600,000
Pennsylvania Canal Co.	2,698,750
Pennsylvania Car Trust.	384,850
Pennsylvania Company, common.	827,000
Pennsylvania Steel Co.	1,830,000
Philadelphia & Erie common.	20,000,000
Philadelphia & Erie preferred.	210,000
Philadelphia & Long Branch.	2,541,800
Philadelphia & Wilmington & Baltimore.	2,400,000
Pittsburgh, Cincinnati & St. Louis preferred.	749,300
Pittsburgh, Fort Wayne & Chicago, special guaranteed.	10,800,950
Pittsburgh, Virginia & Charleston.	3,000,000
Pomeroy & Newark.	66,000
Philadelphia, Germantown & Chestnut Hill.	1,151,050
Philadelphia & Lehigh Valley, installment.	500,000
Ridgway & Clearfield.	999,650
River-Front Railroad.	20,000
Southwest Pennsylvania.	375,000
St. Louis, Vandalia & Terre Haute first preferred.	216,000
Summit Branch.	384,850
Sunbury, Hazleton & Wilkesbarre.	827,000
Susquehanna & Clearfield.	2,190,200
Susquehanna Coal Co.	1,000,000
Tyrone & Clearfield.	340,000
United New Jersey Railroad & Canal.	2,027,800
West Chester Railroad.	1,300,000
Western Pennsylvania.	165,000
West Penn & Shenango Connecting.	925,400
West Jersey.	83,000
<b>Total stocks.</b>	<b>\$83,281,719</b>

This is a total (par value) of \$83,281,719 stocks and \$42,123,800 bonds, making in all \$125,405,519 securities. The cost of which to the company has been \$95,331,716. The interest received from investments in cash, as given in the annual report, was \$4,424,709, or 4.65 per cent. on the cost of these securities. A considerable part of the value of the stocks consists in the control of the several companies which their ownership carries with it.

During the year there was an increase of \$7,341,812 in the par value of stocks; an increase of \$5,403,500 in bonds, and an increase of \$14,293,048 in the cost of securities owned.

#### TECHNICAL.

##### Locomotive Building.

Messrs. Chas. W. Pickering & Co., of Philadelphia, are now agents for Thos. W. Godwin & Co., Norfolk, Va., builders of locomotives and other iron work. They are represented in New York by Mr. A. L. Rowe, who has his office at No. 115 Broadway.

The new passenger engines building at the Vincennes shops for the Ohio & Mississippi road, to which reference has heretofore been made, have 18 by 24 in. cylinders and driving wheels 68 in. in diameter. The boilers are of Otis steel of wagon-top form and have 198 2-in. tubes with fire-box 72 in. long. The driving wheel base is 8 ft. 6 in. and the total wheel base 23 ft. 3 in. The engines weigh 86,000 lbs., of which 53,000 lbs. are on the driving wheels. The tender tank will carry 3,500 gallons of water. The engines have the Richardson balance valves, and have no pumps, but are furnished with two Freidman injectors. They have the American Brake Co.'s driver and tender brakes, which have been adopted as standard on this line. The first of these engines is now completed and on the road, and five others are in progress. They have been designed and built under the supervision of General Master Mechanic J. H. Setchel, and are intended to run the fast and heavy express trains now used on this line.

The Paterson (N. J.) Press of April 1 says: "The total number of locomotives shipped from the shops during the past month was 21, divided as follows: nine from the Cooke Works; two from the Grant Works and ten from the Rogers Works; of the latter six were shipped to Spain."

##### Car Notes.

The Indianapolis Car Works are building 250 box cars for the Chicago, St. Louis & Western road and have recently taken a contract to build a large number of cars for another Western road.

Mr. J. H. Bass, having disposed of his interest in the St. Louis Car Wheel Co. about two years ago, the name of the concern was changed to the Duto Car Wheel Co., and it has since been under the sole management of the Messrs. Duto. Recently, however, Mr. Bass has renewed his connection with the concern as its President. Mr. J. I. White, Secretary of the Bass Foundry & Machine Works, occupies the same position in the St. Louis establishment, which will again be known as the St. Louis Car Wheel Co. He, in connection with Mr. T. C. Duto, Vice-President, will have charge of the business of the company. Mr. J. M. Duto filling the position of Treasurer. Mr. Ezra H. Sinley, so long and favorably known in connection with the railway supply business in St. Louis, appears in the new directory. The capital of the company has been augmented and its facilities increased.—*Car-Builder.*

The Muskegon Car and Engine Co., in Muskegon, Mich., is building 500 box cars for the Nickel-Plate Line. The shops are now running to their full capacity. The company has built a number of coaches and baggage cars for the Chicago & West Michigan road, to be run between Chicago & Grand Rapids. The passenger cars are all 60 ft. long, are finished in mahogany throughout, have toilet rooms for ladies and gentlemen respectively, Hale & Kil-

burn's improved seats, large windows with curtains instead of blinds, and smoking-rooms with seats upholstered in leather.

The Diamond Slate Car Spring Co. in Wilmington, Del., has recently taken large orders for the Erie standard spring, and has also a number of orders on hand for elliptic, spiral, Hibbard, buffer, wire coil and other kinds of springs, including 1,000 sets of the Pennsylvania standard springs.

#### Bridge Notes.

In New York, April 2, the Park Commissioners opened the plans and bids for the new bridge over the Harlem River at 181st street. There were three competitors. The plans by A. P. Boller, the well-known engineer, were for an iron cantilever bridge, 135 ft. high and 100 ft. wide, with a central span 580 ft. long, to cost \$1,500,000. George McNulty, an engineer of the Brooklyn Bridge, contemplated a stone viaduct 132 ft. high and 90 wide, the main arch having a span of 543 ft.; the cost would be \$3,564,000. Joseph M. Wilson, of the Pennsylvania Railroad, presented plans for an iron cantilever bridge, 100 ft. high, 80 ft. wide, and 450 ft. span, to cost \$1,193,347. The plans were placed on file. Each competitor is said to have his supporter in the board, and the issue is doubtful.

#### Iron Notes.

The furnace of the Elk Rapids Iron Co., Elk Rapids, Mich., has gone out of blast. It is a charcoal furnace and has been in blast 503 days, making in that time 23,032 tons of iron.

The Pennsylvania Steel Co., at Steelton, Pa., is running its rail mill on 70-lb. steel rails for the Philadelphia & Reading road. The Harrisburg Patriot says: "Plans are now being prepared by the engineers of the Pennsylvania Steel Co. for the erection of a new mill, to be located between the depot of the Pennsylvania Railroad and the present works, the dimensions of which will be 700 ft. in length, with a corresponding width, and to be equipped with improved machinery for the manufacture of steel rails. Rails will be turned out from heavier ingots than those now used. One ingot will then make from three to four rails, and it will require only the cutting or two crop-ends instead of eight, as would be the case in making rails from a smaller ingot, as at present. Work on the new mill, it is understood, will commence this spring."

The Chicago Forge & Bolt Co., in South Chicago, have a number of orders on hand for bridge, roads, building work, etc.

The firm of Everson, Macrum & Co., Pittsburgh, has been dissolved by mutual consent. Messrs. W. H. Everson and C. L. Graff of the firm will take the mill at Scottdale, in Westmoreland County, Pa., and will operate it under the name of Wm. H. Everson & Co.; while Messrs. John Q. Everson and Walter T. Brown of the firm will take and operate the Pennsylvania Iron Works, in Pittsburgh, under the name of Everson, Brown & Co.

Work has been begun on the new steel works at Wampum, Pa., and the buildings will be put up as fast as possible.

The Allentown Rolling Mill Co., at Allentown, Pa., has started up its Lehigh mill and is preparing to blow in one of the blast furnaces. The company has been recently trying the Baker car-link machine, which is said to have been very successful.

Cosca Furnace, at Gadsden, Ala., which was destroyed by fire some months ago, has been rebuilt and was put in blast last week, making charcoal iron.

#### The Rail Market.

**Steel Rails.**—The market is quiet, with no very heavy sales reported, although several orders of 1,000 and 2,000 tons have been placed. Quotations continue nominally \$34 to \$35 per ton at mill, but some sales have been reported at a less price, one in particular, which was made at \$34.50 per ton delivered, netting about \$33 at mill. Light rails are quite active, and quotations are \$38 to \$40 per ton at mill, according to section. Some inquiries for large orders are reported, but they are said to be for new roads which desire to make payments in securities or on long time, and the makers are hardly prepared to accept such orders as long as there is plenty of cash business.

**Rail Fastenings.**—Quotations continue unchanged at \$2.50 per 100 lbs. for spikes at Pittsburgh, and \$2.75 to \$3 for track-bolts. Splice-bars, 1.75 to 1.80 cents per lb. The market is weak, however, and the demand somewhat light, and it is reported that concessions are made on large orders.

**Old Rails.**—Considerable business is reported in old iron rails, but quotations are so variable that it is difficult to name prices. Sales are reported at from \$21 to \$22.50 per ton for tees at tide water, and \$23.50 for double-heads. Crop-ends (steel) are quoted at \$20.50, with very few sales.

#### British Rail Exports.

Exports of iron and steel rails from Great Britain to the United States and to all countries during February and the two months then ending have been as follows for the past ten years, in tons of 2,240 lbs.:

	1882.	1883.	1884.	1882.	1883.	1884.
To United States:						
Iron rails.	5,404	1,059		14,167	1,190	
Steel rails.	17,774	3,037	3,021	36,278	8,999	5,334
<b>Total.</b>	<b>23,178</b>	<b>4,096</b>	<b>3,021</b>	<b>50,445</b>	<b>10,189</b>	<b>5,334</b>
To All Countries:						
Iron rails.	7,098	4,091	1,681	18,173	7,306	2,513
Steel rails.	56,354	49,086	40,336	113,150	117,362	78,910
<b>Total.</b>	<b>63,452</b>	<b>53,177</b>	<b>42,017</b>	<b>131,323</b>	<b>124,668</b>	<b>81,423</b>

For February the exports to this country thus were not much less than the very small quantity exported last year, but for the two months they were nearly twice as large last year and more than nine times as large in 1882.

In the exports to countries other than the United States for the two months, there is this year a decrease of 34 per cent. from last year, but a trifling increase over 1882.

So far this year more rails have gone to Australasia than anywhere else and 27 per cent. of the total exports, India following with 19 per cent., Brazil with 10 per cent., and the Argentine Republic with 9 per cent., which accounts for about two-thirds of the whole. Mexico took only 497 tons, and Canada but 113.

#### Large Lake Vessel.

Capt. J. Davidson is now building at his yard in Bay City, Mich., a propeller for the Duluth trade, which will be, it is claimed, the largest steam vessel on the lakes. The dimensions of the vessel are as follows: Extreme length, 305 ft.; breadth of beam, 40 ft.; depth of hold, 23 ft.; lower hold, 12 ft.; beneath decks, 10 ft. The new craft was commenced about Nov. 1, 1883, and she is now in frame, with about half her ceiling in place. She is being built of white oak, and 1,500,000 ft. will be used in her construction. Of pine 300,000 ft. will be consumed for decks and cabins. Capt. Davidson expects to have her ready for launching by Aug. 1. Her carrying capacity is placed at 3,000 tons of coal, 100,000 bushels of corn or 2,000,000 ft. of lumber. Her cost will be in the neighborhood of \$150,000. She will be used in the iron ore, coal and grain trade.



**Fast Time.**

The cyclone express, over the Vandalia Line, on Saturday last, made the run from Greencastle to the Belt Railroad crossing, distance 38 miles, in 44 minutes. Just east of Custersburg 2 miles was run in 1 minute and 57 seconds. The fast mail, which consisted of seven cars, last week beat the above record, running from Effingham to Greenup in 23 minutes, distance 21 miles. The train dispatcher's record showed that it was 23 minutes from the time the train left Effingham till it was at a standstill at Greenup.—*St. Louis Republican*, March 28.

The engine "George R. Minot" of the Boston & Providence road, has been making some remarkably fast time for even the well-known speed of the shore line. On March 19 the trip from Providence (44 miles) was accomplished in 65 minutes with seven stops; and on Friday, March 28, a delay from a misplaced signal at Mansfield and another from a hot box beyond West Mansfield were made up, the train reaching Providence on time. 7 miles of the distance having been covered in 6 minutes 51 seconds, part of it being uphill.—*Boston Advertiser*, April 2.

**Rolling Boiler Plates in a Ring.**

The *Engineer* says: "In our annual article, published on Jan. 4, we said: 'A company has been formed, and will start at Barrow-in-Furness, for the manufacture of rolled steel boiler shell hoops without a weld up to 16 ft. in diameter, 1 in. thick and 4 ft. 6 in. wide. This will at once augment the strength of boiler shells by 25 per cent. for a given thickness of plate; only transverse seams will then have to be riveted. The machinery required is of a very heavy type and is being made by a very eminent Manchester firm. There is therefore no reason to doubt that the scheme will be entirely successful.' On March 1 the Vulcan Works, Salt-house, Barrow, where the new process is to be carried on under Mr. Windle's patents, were opened. A large party first proceeded to visit the Bessemer department, where one of the converters was blown, the charge being about five tons weight, being composed of Millom and Askam iron, and tires were subsequently rolled. At luncheon, subsequently, several speeches were made, and the chairman, in returning thanks to the Mayor of Barrow, said, 'they were not going to treat steel in the ordinary manufacture of that metal, but they had secured a patent from their works manager, Mr. John Windle, for the manufacture in the United Kingdom of cylindrical boiler plates without longitudinal seams.' He believed this patent would work out very successfully, and it would be one of the features in the manufacture of steel which would be associated with the town of Barrow. These cylindrical rings of steel would add greatly to the strength of the boiler, as much as, he was told, 25 per cent., and they had it on the authority of Mr. Parker one of Lloyd's chief engineers, that there would be a saving of something even more than this. Especially would this be a saving in the expense of Atlantic liners both by boiler space, boilers required and even economy in fuel. They could produce these plates here and get almost what price they might ask for them, but they did not wish to be unreasonable, as they were thinking of granting licenses to the East Coast, the Clyde and elsewhere. They were going to carry out a specialty at their works. This will no doubt be one of the most important improvements ever introduced in the manufacture of boilers."

It would be interesting to know if by this process a boiler-barrel 50 in. diameter, 11 ft. long, and say  $\frac{1}{4}$  in. thick could be turned out in one plate, without any joints. The saving in weight of butt strips, etc., would be worth having.

Supposing that the solid plate boiler could be made  $\frac{1}{2}$  in. thinner or  $\frac{1}{4}$  in. instead of  $\frac{1}{2}$  in., it would weigh about 500 lbs. less than a well-jointed boiler constructed in the ordinary way. The price of 1,000 lbs. of boiler iron or steel, and the saving in drilling holes and riveting would go some way toward paying interest on the cost of the machinery for making the barrel in a ring.

**Radial Trucks.**

One of the cars on the Brooklyn Bridge has been provided with trucks built by the American Radial Truck Co., in which, it is claimed, the axles will always adjust themselves to the track, making the passage of the trucks around a sharp curve easier. The truck is to have a thorough trial.

**A Russian Pacific Railroad.**

The Russian government has an immense railway project under consideration. The author of the scheme calls it the Russian Pacific Line. The line would start from Ikaterinenburg, join Tobolsk, Yeneseik and Yakutsk, ending in Nikolajew, with a branch line from Yeneseik and Yakutsk to Kiakita, which would form a connection with the Amoor and China. A second main line will start from Astrachan to connect Herat, Persia, and India, with a branch line to Bokhara over Kashgar. The extent of railway would be nearly 10,000 miles, and cost \$750,000,000. The capital would be spread over 20 years. One part of the proposal is to employ part of the army on the works.

**Shutting Up a Tunnel.**

An exchange says that folding doors have been placed at each end of the Bozeman Tunnel on the Northern Pacific Railroad, for the purpose of preventing the water from freezing.

**Keely Nearing the End.**

It was announced from Philadelphia on the 17th of March that the Keely motor was practically completed. All the workmen had been discharged, and Mr. Keely was immediately to begin "focalizing and adjusting the vibrators"—a delicate operation, but easy for him—and as soon as he obtained "one perfect revolution, though ever so slow," the great invention would be complete. The news called forth several funny paragraphs in the newspapers and quite a flutter among the stockholders and directors, who have been for several years investing money to back up this nineteenth century discoverer of "perpetual motion." It is difficult indeed to consider seriously this alleged invention, or justly characterize the inventor, who, in this age, not only assumes to get something out of nothing, but would hide all his methods and processes and affect more than the mystery of the alchemists of the early ages. Yet it is a serious matter to those who have been sinking their money therein. Now, however, we seem at last to have reached the "beginning of the end," and the attention of the investors can, at an early day, be "focalized" on their profit and loss accounts.—*Scientific American*.

**Square Corners Invite Fracture.**

A curious instance of the danger arising from square corners was related to us recently by a railway master mechanic of a near-by road. A strap on a side-rod had broken, and while repairs were being made the other side-rod was inspected. It was found that this was cracked, and that the point of fracture began where the planer-tool had jumped in while planing off the chamfer on the rod. Where the tool stopped there was, of course, a short square shoulder, and the jar and vibration at high speed had sought this spot as the most favorable one for destructive effects.

Our informant also advises us that they frequently break steel piston-rods, and that in every instance the fracture

commences in the corner of the key-way. These corners are square, and the inference is that they invite, if they are not the actual cause of breakage.—*Mechanical Engineer*.

**Making Car-links by Machinery.**

The Baker car-link machine, which was tried at the Allentown Rolling Mill last week, is said to have proved a complete success. This machine will do away with making links by hand, and at the same time will make a stronger one. The link is made from a billet which is drawn out into a bar  $1\frac{1}{2}$  by  $\frac{1}{4}$  in. and 12 ft. long. This is then coiled and welded, making a continuous weld, thus avoiding the old fault of having the weld in one place in the link, that being the weak spot. Several orders have been placed, and the railroad men that have seen the link and the mode of making speak approvingly of it.—*Iron Age*.

**Fast Time on the Fast Mail.**

Speaking of the new fast mail train over the Chicago, Burlington & Quincy road, the *Galesburg* (Ill.) *Plaindealer* says: "A record of the run of the first day showed that the 163 miles to Galesburg had been made in 212 minutes, including the stops, which in every instance were more than 5 minutes, and reduced the actual running record to 193 minutes for 163 miles. George Clark, the engineer who took the train at this city, wanted to scare the boys, and obtained permission to go wild. The result was that the train approached the Mississippi bridge at Burlington 25 minutes ahead of schedule time, having made 42 miles an hour. A number of stops were made, and in several instances the rate slackened to a slow gait while going over reverse curves. This was done to prevent the repetition of an accident which occurred just east of Galesburg and for an instant resembled a calamity. The engineer had his engine at the best and failed to slacken on a double curve. When he struck the turn the cars jumped and threatened to careen. At the counter-bend the force of the blow raised the first car off its trucks and jerked it so like a whip-cracker that the mail pouches were knocked off the hooks, the clerks were overturned, and the mail drawers emptied upon the floor."

**Sheathing of Freight Cars.**

Mr. Adams, the General Master Car-Builder of the Boston & Albany road, has adopted horizontal sheathing for his freight cars. As the majority of box cars are sheathed vertically the reasons for this departure from established usage are worth considering. The sheathing is put on with the tongue up, and being nailed firmly in place the car frame is stiffened to a very appreciable extent. With vertical boards there is practically no increase in the stiffness of the car, and the boards collectively do not tend to prevent sagging as they do when placed horizontally. When the lumber shrinks the vertical joint opens, and the water, running down the side of the car, works inside around the tongue. With horizontal boarding, on the other hand, the water may penetrate the joint, but it cannot rise over the tongue. When the car is in motion the water is blown out of the joint instead of being blown through it if it is very open.

For this reason the horizontal boarding seems to have a decided advantage over the vertical. The most marked advantage appears in repairing an injury upon a corner, followed by stripping or raking along the sill. Vertical boarding usually requires the replacement of the whole sheathing as far back as the last injured board. With horizontal sheathing only those boards are replaced which are broken. In taking out a side sill or making any other similar repairs the superiority is very marked. It appears from these considerations that the advantages are greatly in favor of sheathing put on horizontally.—*National Car-Builder*.

**Freezing Process for Excavations in Soft Soil and Quicksand.**

A process which is quite new to us, and seems to contain the germ, at least, of a useful addition to the engineer's list of expedients, has originated in Germany, and is known as Poetsch's process. Neglecting all questions of comparative cost, there seems no reason why it should not be applicable to a great variety of uses in connection with difficult foundation work and with tunneling in soft ground, as, for example, to a tunnel now building in France—which has been given a nick-name which may be freely translated as "the devil's own tunnel" because of a stratum of soft material some 80 ft. through, extending to the top of the mountain and sliding in as fast as removed, so that the consulting engineers have pronounced it impossible to complete the tunnel. The process is thus described:

The idea is to convert the quicksand or any soft, water-soaked soil into solid rock of convenient hardness for excavation by means of a freezing mixture. Iron pipes 8 in. in diameter, and closed at the lower end, are forced down into the soft sand and mud. Inside of each pipe is an open pipe of smaller diameter to afford circulation for the cooling liquid, which is forced down through the inner pipe and returns through the larger one surrounding it. The cooling liquid is a saturated solution of chloride of calcium, which is cooled to 40° or 50° below the freezing point by means of an ice machine. In a short time each tube becomes surrounded with a conical mass of frozen soil. As the work progresses the whole space between the pipes becomes solid, and can be removed like any other rock.

This process has been used successfully in deepening a shaft at the Archibald Brown coal mine. A shaft 15 ft. 8 in. by 10 ft. 6 in. was driven through a strata of quicksand 18 ft. thick. The cold was produced with an ammonia ice machine.

It is also proposed to use this process instead of caissons with compressed air for ordinary submarine foundations. In this case a series of tubes are driven into the soil in such a manner as to form a circle several feet in diameter; when this annular mass has been frozen the centre can be excavated and a pier built there, the workmen being fully protected by the wall of frozen earth surrounding them. Brenneke suggests that it would be an improvement on the method used at the tunnel under the Hudson River.

**THE SCRAP HEAP.****A Race with a Cyclone.**

A remarkable and thrilling incident of last Tuesday's storm is related by a party traveling on a train on the Chester & Lenoir road at the time the incident occurred. The train had passed Lowersville and was speeding in the direction of Lincoln, when all on board was startled by a roaring sound that could be distinctly heard above the noise of the train, and on glancing back they saw an immense whirlwind tearing along the railroad track, following directly behind the train at a rapid rate. The engineer was among the first to see it and realizing what the consequence would be should the whirlwind overtake the train, he pulled the throttle wide open and an exciting race began. The whirlwind was not more than 500 yards behind the train and the anxious passengers soon became aware of the painful fact that it was gradually gaining upon them. There were several ladies in the car, and they cried and carried on at a terrible rate, while the men danced about the car in their excitement, vainly yelling at the engineer to put on more steam. The race was kept up in this way for two miles, when the train turned a curve in the road. As the whirl-

wind struck the curve it left the railroad track, speeding its way straight on through the fields. At the time it left the track it was not more than 300 yards behind the train. It was a thrilling race, and all the passengers blessed that curve from the bottom of their hearts.—*Charlotte (N. C.) Observer*, March 28.

**Wind.**

The best chest protector—fifty cents to the baggage-master.—*Bulletin*.

"Constant Reader" asks, "When is the best time to travel?" We should say it was when you hear the old gentleman coming down the stairs.—*Oil-City Derrick*.

"The Devil's Ride" is the title of a poem soon to be published. We presume it describes a sleeping-car journey in a berth next to that of a snorer.—*Post*.

Mr. Barnum could never get a position as brakeman on a railroad under the new color-blind test. He doesn't know a white from a mouse-color elephant.—*Commercial Advertiser*.

The wind was so strong in Dakota the other day that it stopped a train. An auctioneer, who was on board, got off, and talked back at the wind; and in less than three minutes he had broken it all to pieces. Then the train went on.—*Chronicle Herald*.

Bangor, at its charter election yesterday, voted 2,320 for local against 406 for standard time. The pluck of the lumber-city is more to be admired than its judgment.—*Transcript*.

And down in Berks County, Penn., it is said they still vote for Andrew Jackson for President.—*Pathfinder Guide*.

**A Runaway Engine.**

"About 15 years ago I was running on the Little Miami Railroad. The Marietta & Cincinnati was just completed, and it used the Little Miami tracks as an entrance to Cincinnati. The Marietta & Cincinnati constructed a temporary round-house near the station. The Miami shops were about four miles away. The locomotives of the Miami trains backed from the shops to the depot. It was early in the morning of the day I speak of—a dark, foggy day—and the smoke of the city was so dense that one could only see a few feet before him. A Marietta engine had been getting up steam and had gone out on the Miami track. The engineer was not on board, and the fireman ran the locomotive up and down the yard several times to pump water."

"He was backing up the track with a full head of steam when suddenly he saw the Miami engine backing down. It was so close that nothing could be done to keep the engines from colliding. He reversed his lever and shut off the throttle, and jumped from his seat to the ground, expecting that after the engines struck his would reverse and he would jump on again. The shock from the collision was heavy, but the Marietta locomotive reversed so quickly that he lost his footing, and the throttle being thrown wide open by the jar, the locomotive went tearing down the track toward the depot at a terrific speed."

"In the depot we saw the Miami express waiting for its locomotive. The baggage car was being loaded and the six passenger coaches were well filled. None of the depot people knew of what was going on and little thought of the danger in which they were placed. The runaway engine was gaining speed as it ran. It was within 100 yards of the depot when a young switch tender noticed it, and, thinking something was wrong, turned the switch so that the locomotive ran in on the next track to the express, which was luckily vacant at the time. At the end of the track was a heavy brick pillar about 3 ft. square, which supported the arch that covered the tracks. The terrible force with which the locomotive struck the pillar carried it away, and the engine, striking the stone sill, was lifted into the air and shot like an arrow over the street and into a coal yard on the other side, where it came to a standstill, snorting and blowing."

"But was no one hurt?"

"Not a soul. The most wonderful thing I ever saw or heard of. If it had not been for the switchman the loss of life must have been very large. I tell you it was a terrible strain on a man for a minute or two."

"But the switchman, what has become of him?"

"I don't know. He told me afterward that he did not know what made him turn the switch, but it seemed as if something was wrong, and that was the right thing to do."—*St. Louis Republican*.

**A Singular Accident.**

A somewhat curious and perhaps fatal accident occurred on one of the Delaware, Lackawanna & Western freight trains Monday afternoon, William Loneragan, engineer. The freight was coming toward Elmira, and was in the immediate neighborhood of Big Flats. His fireman being tired out Mr. Loneragan said he would fire for a while. As the train was nearing a bridge, and when after stoking the fire, and pulling out the long poker they were going over it, it swung around just in the right position and caught in the bridge, the poker catching him in the left side and threw him out with great force against the railing of the bridge, terribly smashing and cutting his head and face. He then fell heavily on the rails, striking on his side unconscious, but catching in such a manner between the ties that he did not drop through the bridge. The remarkable thing about this is that he fell in a heap with his hands close to his side, and his body somewhat drawn up, but just after the train passing him he regained his senses somewhat, and threw his arms and one of his legs out on the rails over which the train had just passed, and which would have ground and cut them off.—*Elmira Gazette and Free Press*.

**General Railroad News.****MEETINGS AND ANNOUNCEMENTS.****Meetings.**

Meetings will be held as follows:

*Chicago & Alton*, annual meeting, at the office in Chicago, April 7, at 10 a. m. Transfer books closed March 15.

*Lake Shore & Michigan Southern*, annual meeting, at the office in Cleveland, O., May 7.

*Michigan Central*, annual meeting, at the office in Detroit, Mich., May 8.

*New York Central & Hudson River*, annual meeting, at the office in the Union Depot in Albany, N. Y., April 16, at noon.

*New York, Chicago & St. Louis*, annual meeting, in Cleveland, O., May 7.

**Dividends.**

Dividends have been declared as follows:

*Atchison, Topeka & Santa Fe*,  $1\frac{1}{2}$  per cent., quarterly, payable May 15, to stockholders of record on April 26.

*Berkshire* (leased to Housatonic),  $1\frac{1}{2}$  per cent., quarterly, payable April 1.

*Boston & Albany*, 2 per cent., quarterly, payable March 31.

*Cumberland Valley*,  $2\frac{1}{2}$  per cent., quarterly, payable April 1.

*Delaware, Lackawanna & Western*, 2 per cent., quarterly, payable April 21. Transfer books close April 2.



*European & North American* (leased to Maine Central), 2½ per cent., semi-annual, payable April 1.  
*Housatonic*, 2 per cent., quarterly, on the preferred stock, payable April 15. Transfer books close April 4.  
*Lake Shore & Michigan Southern*, 2 per cent., quarterly, payable May 1. Transfer books close April 3.  
*Long Island*, 1 per cent., quarterly, payable May 1. Transfer books close April 15.  
*Manhattan*, 1½ per cent., quarterly, on the first preferred stock, payable April 1, "provided the legal restraint on such payment is removed."  
*Pittsburgh, Fort Wayne & Chicago* (leased to Pennsylvania Company), 1½ per cent., quarterly, on special stock, payable April 1; 1¼ per cent., quarterly, on regular stock, payable April 8.  
*St. Paul, Minneapolis & Manitoba*, 2 per cent., quarterly, payable May 1. Transfer books close April 16.  
*Sioux City & Pacific*, 3¼ per cent., semi-annual, on the preferred stock, payable April 5.  
*United New Jersey* (leased to Pennsylvania Railroad Co.), 2½ per cent., quarterly, payable April 10.  
*Vermont & Massachusetts* (leased to Fitchburg), 3 per cent., semi-annual, payable April 7.

#### Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:  
*General Time Convention*, Spring meeting, at the Grand Hotel in Cincinnati, O., at 11 a. m., on Wednesday, April 9.  
*Southern Association of General Passenger and Ticket Agents*, semi-annual meeting, in Charleston, S. C., on Wednesday, April 9.  
*Southern Time Convention*, Spring meeting, at No. 46 Bond street, New York, at 11 a. m., on Wednesday, April 16.  
*Master Car-Builders' Club*, monthly meeting, at the rooms, No. 113 Liberty street, New York, on Wednesday evening, April 17, at 8 o'clock. Subjects for discussion: Lighting, Heating and Ventilating Passenger Coaches; Automatic Freight Car Couplings.  
*Association of American Railroad Superintendents*, semi-annual meeting, at No. 46 Bond street, New York city, on Monday, April 21.  
*American Society of Mechanical Engineers*, Spring meeting, in Pittsburgh, Pa., on Tuesday, May 20.  
*Railway Car Accountants' Association*, annual convention, in Richmond, Va., on Tuesday, May 20. Western members are requested to meet in Ashland, Ky., May 18; Southern members in Atlanta, Ga., May 17, and Eastern members in Washington, May 19, to proceed to Richmond together.  
*Master Car-Builders' Association*, annual convention, in Saratoga, N. Y., beginning on Tuesday, June 10.  
*Master Mechanics' Association*, annual convention, in Long Branch, N. J., beginning on Tuesday, June 17.  
*Railway Telegraph Superintendents' Association*, annual convention, in Boston, on Tuesday, June 17.  
*General Baggage Agents' Association*, semi-annual meeting, in Boston, on Wednesday, July 16.  
*Master Car-Painters' Association*, annual convention, in Boston, on Wednesday, Sept. 3.  
*Road-Masters' Association of America*, annual convention, in Indianapolis, Ind., on Wednesday, Sept. 10.  
*American Street Railway Association*, annual convention, in New York, on Wednesday, Oct. 15.

#### Foreclosure Sales.

The *Midland, North Carolina*, road was sold at sheriff's sale in Raleigh, N. C., April 1, and bought for \$2,800 by Charles F. Smith, of Boston. The road extends from Goldboro, N. C., to Smithfield, 22 miles, and was the commencement of a line from Goldboro to Salisbury. It was built by the Midland Construction Co., of Boston, which afterward became insolvent.

#### Boston & Albany Mutual Relief Association.

The Boston & Albany Railroad Mutual Relief Association now has a membership of 420. The annual income now more than pays all expenses. The amount paid out last year to the families of members was \$4,791, and during the 14 years of its existence the association has paid \$111,558. A. Holt is its Secretary and Treasurer, and the following are its trustees: A. B. Underhill, William H. Stearns, Robert E. Ellis, H. C. Hamilton, John W. Clark, A. S. Bryant and E. W. Brown.

#### New England Railway Club.

The annual meeting of the New England Railway Club was held March 26 at its rooms in the passenger station of the Boston & Albany Railroad. There was a good attendance, the Vice-President, Mr. J. W. Marden, of the Fitchburg road, presiding. The following officers were elected for the ensuing year: President, F. D. Adams, of the Boston & Albany; Vice-President, J. W. Marden, of the Fitchburg; Secretary and Treasurer, J. M. Ford, of the Boston & Albany; Executive Committee, James N. Lauder, of the Old Colony; D. C. Richardson, of the Boston & Maine; George Richards, of the Boston & Providence; F. D. Adams and J. W. Marden *ex officio*. From the report of the retiring Secretary, Mr. George E. Pratt, it appears that the club numbers 97 members, and during the first year of its existence a large number of practical subjects connected with the construction and wear of rolling stock have been discussed with much profit to the club. The balance of the evening was occupied by a free discussion of car appliances.

A vote of thanks was given to the late Secretary and Treasurer, George E. Pratt, and the club presented him with \$50 as an expression of its appreciation of his efficient services.

The membership fee was increased from \$1 to \$2 by vote of the club.

#### ELECTIONS AND APPOINTMENTS.

*Arizona Southern*.—This company has elected Thomas Nickerson President; Charles C. Blodgett, Secretary; S. W. Reynolds, Treasurer.

*Atlanta & West Point*.—Mr. E. B. McDaniel has been appointed Car Accountant in place of Hugh W. Gabbett.

*Boston, Hoosac Tunnel & Western*.—From April 1 the offices of the General Manager, the Chief Engineer, the Auditor and the Assistant Treasurer are at Mechanicsville, N. Y., instead of Saratoga as heretofore.

*Buffalo, New York & Philadelphia*.—Mr. J. W. Watson, Superintendent of the Narrow-Gauge Division, has been appointed Superintendent of the Rochester Division also, in place of Mr. R. M. Patterson who has gone to the Lackawanna & Pittsburgh road.

*Burlington & Missouri River*.—Mr. George H. Crosby has been appointed First Assistant General Freight Agent with headquarters at Denver, Col. He will continue to perform his present duties as General Agent at Denver. Mr. A. B. Smith has been appointed Second Assistant General Freight Agent with headquarters at Omaha.

*Chautauque Steamboat Co.*—Mr. John Wise, Chief Engineer of this company, having resigned to accept a position

with the Anchor Line of steamers, Mr. James M. Graham is appointed to fill the vacancy, to take effect April 1.

*Chicago, Burlington & Quincy*.—Mr. E. G. Squire has been appointed Superintendent of Car Service with headquarters in Chicago. He will have charge of the distribution of the freight equipment. He will also have charge of all car mileage accounts, tracing of cars, and such other duties as may be assigned to him.

*Chicago & Gulf Air Line*.—At the annual meeting in Tuscaloosa, Ala., April 2, the following officers were chosen: President, C. C. Merrick, Chicago; Vice-President, N. K. Clements, Tuscaloosa, Ala.; Secretary and Treasurer, James Little.

*Chicago, Milwaukee & St. Paul*.—Mr. Dwight W. Keyes has been appointed First Assistant General Freight Agent, and N. J. Goll Second Assistant General Freight Agent, with offices at Milwaukee.

*Chicago & Wisconsin*.—The directors of this new company are: Elijah Stanford, Foothill, Ill.; Henry T. Glover, H. J. Hawley, John B. Jackson, Thomas B. Marston, Charles R. Schlingan, Chicago.

*Cornwall & Mt. Hope*.—The officers of this road are: Wm. C. Freeman, President, Cornwall, Pa.; C. von Schmalenski, Chief Engineer, Lebanon, Pa.; D. S. Hammond, Secretary and Treasurer.

*Danville, Olney & Ohio River*.—The following circular was issued by the late Receiver, Mr. Charles Howard, dated Olney, Ill., March 25:

"Having resigned my position as Receiver, the road and property of the Danville, Olney & Ohio River Railroad Co. is this day turned over to C. E. Henderson, who has been appointed Receiver."

The new Receiver issued the following circular on the same date:

"Mr. G. L. Dickenson is appointed Auditor, with office at Indianapolis. Mr. W. W. Lynn is appointed Cashier for the Receiver, with office at Indianapolis. All other employees are requested to continue in the performance of their respective duties, unless otherwise notified."

*Denver & Rio Grande*.—In Salt Lake, April 1, President Lovejoy issued an order dismissing General Manager Dodge, Chief Engineer McMurtrie, and Superintendent of Telegraph Woodward from the service of the company. He appointed at the same time General Superintendent R. E. Kicker to be Acting General Manager, General Freight Agent A. S. Hughes General Traffic Manager, and R. A. Hutchinson Superintendent of Telegraph. It is said that Mr. Dodge will refuse to obey the order, at least so far as it relates to the Utah lines, claiming that the President has no authority to dismiss him from the management of those lines as his position was secured by the terms of the lease. This action of the President was recently authorized by the board of directors in New York.

Mr. Wm. Wagner has been appointed Treasurer in place of Wm. M. Spackman, resigned.

*Hannibal & St. Joseph*.—Mr. J. F. Barnard has been appointed General Manager, with headquarters at St. Joseph, Mo., taking effect April 1. Mr. Barnard has been for a number of years General Superintendent of the Kansas City, St. Joseph & Council Bluffs road.

*Hopkins*.—The directors of this new company are: James Walker, Scottsville, Ill.; Conrad Gavis, William F. Gavis, Carlinville, Ill.; H. S. Hopkins, Wm. McCully, St. Louis.

*Illinois Central*.—The board has elected James C. Clarke President; Stuyvesant Fish, Vice-President; L. V. F. Randolph, Treasurer; W. J. Mauriac, Secretary. The only change is the election of Mr. Mauriac (heretofore Assistant Secretary) Secretary in place of L. A. Catlin, resigned.

*Lackawanna & Pittsburgh*.—Mr. R. M. Patterson has been appointed General Superintendent. He was recently on the Buffalo, New York & Philadelphia road.

*Lehigh & Hudson River*.—Mr. N. L. Furman has been appointed Superintendent of this company, vice Mr. W. L. Anderson, resigned. His office is at Warwick, N. Y. All communications should be addressed to him accordingly.

*Lehigh Valley*.—President E. P. Wilbur announces the appointment of John H. Heckman as General Freight Agent, with headquarters at Muncy Chunk, Pa., and Mr. John Whittle as Assistant General Freight Agent, with headquarters Sayre.

*Louisville, New Albany & Chicago*.—Mr. C. C. F. Bent has been appointed Superintendent of Transportation, with office at LaFayette, Ind. The office of division superintendent is abolished. Mr. Bent was formerly on the Columbus, Chicago & Indiana Central road.

*Mexican Central*.—The *Mexican Financier* of March 15, says: "Several changes have been made in the officers of the Mexican Central. Mr. F. W. Howard has resigned as Assistant Treasurer, and Mr. D. B. Hunt, Assistant Auditor, has been temporarily appointed to the place. Mr. Hunt will continue as Auditor. The change takes effect to day, March 15. Mr. J. H. Smith has been appointed Superintendent of the Second Division, between Silao and Calera, in place of Mr. G. T. Jarvis, who, after a month's vacation in the United States will probably become Superintendent of the First Division, between Mexico and Silao, in place of Mr. R. E. Comfort, who will take charge of the Fourth Division, from Santa Rosalia to Paso del Norte. Mr. Davis will be the Superintendent of the Third Division, between Calera and Santa Rosalia."

*Michigan & Ohio*.—The present list of officers of this company is as follows: J. A. Latcha, President, Toledo, O.; Fred. A. Brown, Treasurer, New York; L. M. Schwan, Secretary, New York; F. S. Anable, Auditor, Toledo, O.; J. W. Richards, Cashier, Toledo, O.; D. J. Durrell, Master Mechanic, Marshall, Mich.; B. McHugh, General Freight and Passenger Agent, Toledo, O.; H. H. Mitchell, Assistant General Freight Agent and Purchase Agent, Toledo, O.; W. L. Webb, Engineer Maintenance of Way, Toledo, Ohio.

*Missouri Pacific*.—Mr. J. C. Nicholas has been appointed General Baggage Agent for all the lines owned, leased and controlled by this company, with office in St. Louis.

*New Castle Northern*.—The United States Circuit Court in Pittsburgh has appointed D. W. C. Carroll, of Pittsburgh, Receiver of this company. The company owns no completed road and has two boards of directors, each claiming to be legally elected.

*New England Railway Club*.—The officers elected at the annual meeting last week are: President, F. D. Adams; Vice-President, J. W. Marden; Secretary and Treasurer, J. M. Ford; Executive Committee, J. N. Lauder, D. C. Richardson, George Richards.

*New York Central & Hudson River*.—Mr. L. Packard has been appointed Master Car-Building, in charge of the West Albany shops, in place of D. Hoyt, resigned. Mr. Packard was recently on the Baltimore & Ohio.

Mr. E. Chamberlain, recently connected with the West

Albany shops, has been appointed Master Car-Building in charge of the Buffalo shops.

*New York, New Haven & Hartford*.—The following circular has been issued by President George H. Watrous:

"C. T. Hempstead, Esq., heretofore General Ticket Agent of this company, has been appointed its General Passenger and Ticket Agent."

"Hereafter, all applications for special rates in the Passenger Department, whether by regular or special trains, must be referred to him."

*St. Paul, Minneapolis & Manitoba*.—The following circular from General Manager A. Manvel is dated St. Paul, March 28:

"Mr. N. D. Miller, Superintendent of Bridges and Buildings, having been assigned to other duties, from and after April 1, 1884, the general charge of track, bridges, buildings, and water supply will be placed in the hands of Col. C. C. Smith, Chief Engineer, and his orders in all matters pertaining thereto will be respected."

*San Francisco & New Almaden*.—The directors of this new company are: N. Doyley, D. M. Carman, San Jose, Cal.; H. E. Bullock, S. B. Morey, Oakland, Cal.; J. W. Dodge, San Francisco.

*Savannah Valley*.—Capt. C. S. Dwight has been appointed Chief Engineer. He is also Chief Engineer of the Augusta, Elberton & Chicago road.

*Shenandoah & Allegheny*.—The Receiver has appointed I. D. Stinson Treasurer and General Passenger Agent and P. E. McCray Auditor. Mr. J. T. Blair is continued as General Manager.

*South Carolina*.—At the annual meeting in Charleston, S. C., April 2, the following directors were chosen: Samuel Sloan, Percy R. Payne, T. Bailey Myers, James J. Higginson, Francis A. Stout, Henry P. Talmadge, Frederick Hardy, Gustavus A. Kissell, Henry Sampson. The board re-elected Henry P. Talmadge President.

*Staten Island*.—At the annual meeting, April 1, directors were elected as follows: Nathan G. Miller, B. Kreischer, Nathaniel Marsh, John W. Mersereau, W. W. Macfarland, Louis de Jonge, William King, J. H. F. Mayo, Charles Watrous, James M. Davis, R. M. Gallaway, George F. Kreischer, Erastus Wiman.

*Wells, Fargo & Co. Express*.—E. M. Cooper has been appointed General Superintendent for the Western Department, which embraces all lines west of the Rocky Mountains, including those in Texas, Louisiana and Mexico, with headquarters at San Francisco.

W. J. Hancock has been appointed General Superintendent of the Eastern Department, and will have charge of all lines east of the Rocky Mountains, with headquarters at Council Bluffs, Iowa.

*Western, of Alabama*.—Mr. E. B. McDaniel has been appointed Car Accountant in place of Hugh W. Gabbett, resigned.

*Wisconsin, Iowa & Nebraska*.—Mr. Willard T. Block, in addition to his duties as Auditor and Local Treasurer has been appointed General Freight and Passenger Agent.

#### PERSONAL.

—Mr. L. D. Voak has resigned his position as General Live Stock Agent of the Missouri Pacific road, taking effect April 1.

—Mr. R. N. Baird has resigned his position as Chief Train Dispatcher of the Laredo Division of the International & Great Northern road.

—It is reported that Mr. S. R. Callaway, General Manager of the Chicago & Grand Trunk road, has been offered an important position on the Northern Pacific road.

—Mr. Wm. M. Strong died suddenly in New York, March 28. He was for many years Master Mechanic of the New York & Harlem road, but retired from that position several years ago.

—Mr. George M. Thompson, whose death was announced in our issue of March 22 last (on the authority of the *Two Republics*, of Mexico), sends us a letter contradicting this report.

—Mr. C. B. Kinnan, formerly of the Missouri Pacific road and lately General Western Agent of the Louisville, Evansville & St. Louis road, has accepted a position in the passenger department of the Northern Pacific road at St. Paul.

—General Manager D. C. Dodge, Chief Engineer J. A. McMurtrie and Superintendent of Telegraph B. F. Woodward, of the Denver & Rio Grande road, have been removed from their several positions by the President of the company.

—Mr. D. Hoyt, for some time past Master Car-Building in charge of the West Albany shops of the New York Central Railroad, has resigned that position and is now Superintendent of the Gilbert & Bush Car Co., whose extensive works are at Troy, N. Y.

—Mr. J. K. Taylor, late Master Mechanic of the Main Line Division of the Old Colony road, leaves Boston shortly for a trip South and West. He expects to spend a few months in the mountains of California and Oregon, with the expectation of benefiting his health.

—Mr. W. N. Marshall, Superintendent of the Southern Division, and W. G. Sale, Superintendent of the Northern Division of the Louisville, New Albany & Chicago road, have resigned their respective positions, and the office of division superintendent will be abolished.

—Mr. J. H. F. Wiers, formerly Master Car-Building of the Atlantic & Great Western road, afterward Superintendent of the Pullman works at Pullman, Ill., and more recently with the Toledo, Cincinnati & St. Louis road, is now Superintendent of the Paige Car Wheel works at Cleveland.

—Mr. Edward H. Phelps, for some years past Chief Engineer on the Michigan Central Railroad, died in Detroit, March 20. Mr. Phelps was born in Burlington, Vt., and had been connected with a number of roads. His last active work was in connection with the company's new bridge over the Niagara River.

—Mr. George E. Pratt, formerly of the Car Department of the Fitchburg Railroad at Boston, is now connected with the Machinery Department of the New York, West Shore & Buffalo road, having his headquarters at Buffalo, N. Y. Mr. Pratt has been Secretary of the New England Railway Club from its organization until the annual meeting last week, when he retired on account of his removal from Boston.

—Mr. H. Bartels, whom many American railroad men will remember as a delegate of the Prussian government to the Centennial Exhibition, and who wrote a little book on American railroads, has recently been promoted to be



assistant on the "operating bureaus" of two of the divisions of a state railroad, which have their headquarters at Berlin and Breslau, respectively. His title is "Eisenbahn-Bau und Betriebs Inspector"—inspector of railroad construction and operation.

—Louis Enos, Traveling Auditor and Paymaster of the St. Louis & Cairo road, has disappeared, and, it is stated, has taken with him the sum of \$8,000 of the company's money which he procured on forged checks from the bank which is depository of the company's funds. Enos is well known among railroad men, having served on the Louisville & Nashville and on several other roads in various capacities. He is an excellent accountant, and possessed the confidence of his superior officers.

—Mr. Augustus Schell, who died in New York, March 27, aged 72 years, was chiefly known in that city as a lawyer and a man of considerable means who gave his time largely to politics. For many years he was a prominent Democrat, but, although he was one of the leaders of the party, he held office only once, when he served a term as Collector of the Port of New York. His connection with railroads was almost entirely with the Vanderbilt companies; he served as a director in the New York Central & Hudson River, the New York, New Haven & Hartford, the Lake Shore & Michigan Southern, the Union Pacific, the Chicago & North-western, the Cleveland, Columbus, Cincinnati & Indianapolis, and the Michigan Central railroad companies.

—Mr. T. A. Matsdaira, the new City Engineer of Bradford, Pa., is a native of Japan, and the first man of his nationality to be chosen to a civil office in the United States. He is the son of a Japanese nobleman, and came to this country in 1870 to be educated, not at the expense of his government, but at the individual expense of his father, who planned to have his son return home and be appointed to a high position under the Japanese government. Upon being graduated he asked consent to remain a few years longer to practice civil engineering. His father replied that unless he came home on the next steamer his allowance would cease, and he need expect no more help from him. The son replied that he would stay, and the father became angry and wrote to his Japanese friends to have nothing to do with the young man. He remained and practiced his profession, acting for some time as Assistant Engineer of the Manhattan Elevated Railroad in New York, and afterward for three years as Engineer on the Union Pacific Railroad in Wyoming, Idaho, and Montana.

## TRAFFIC AND EARNINGS.

### Railroad Earnings.

Earnings for various periods are reported as follows:

Two months ending Feb. 29:				
	1884.	1883.	Inc. or Dec.	P. c.
Pennsylvania	\$7,000,946	\$7,641,552	D. 640,606	8.4
Net earnings	2,290,695	2,807,732	D. 517,037	18.4
Phila. & Reading	2,736,690	3,062,637	D. 325,947	10.6
Reading lines	9,845	1,301,438	D. 372,973	28.7
Central lines	1,461,453	4,833,393	D. 3,371,940	23.1
Net earnings	4,833,393	123,875	I. 12,611	10.2
West Jersey	136,486	41,577	I. 9,029	21.7
Net earnings	50,606			
Month of January:				
Atch., T. & S. F.	\$1,172,348	\$1,065,794	I. 106,554	10.0
Net earnings	603,284	416,075	I. 187,209	45.0
N. Y. & N. Eng.	246,765	245,681	I. 1,084	0.4
Net earnings	21,624	29,106		
Month of February:				
Pennsylvania	\$3,426,713	\$3,712,195	D. 285,482	7.7
Net earnings	1,124,559	1,336,674	D. 212,115	15.9
Phila. & Reading	1,236,940	1,453,862	D. 216,922	14.9
Reading lines	347,490	636,096	D. 278,606	44.5
Central lines	768,402	291,155	I. 477,247	16.1
Net earnings	67,186	62,036	I. 5,150	8.3
West Jersey	25,706	20,005	I. 5,701	28.5
Net earnings				
Third week in March:				
Bur., C. R. & No.	\$55,465	\$57,778	D. 2,313	4.1
Ches. & Ohio	69,492	66,851	I. 2,641	3.9
Chi. & East. Ill.	25,385	34,336	D. 8,951	26.3
Chi. & W. Mich.	30,633	36,813	D. 6,180	16.7
Det., Lan. & No.	25,959	28,054	D. 2,095	7.5
Ediz., Lex. & B. S.	15,601	12,019	I. 3,582	30.3
Flint & Pere M.	53,578	50,048	I. 3,530	7.1
Florida Ry. & N.				
Co.	18,119	15,811	I. 2,308	7.7
Long Island	39,369	41,810	D. 2,441	5.9
Mil. & Northern	11,525	10,545	I. 980	9.3
Peoria, Dec. & E.	14,390	12,853	I. 1,537	11.8

\* Deficit.

Weekly reports of earnings are generally estimated in part, and are subject to correction by later statements.

### Grain Movement.

For the week ending March 22 receipts and shipments of grain of all kinds at the eight reporting Northwestern markets and receipts at the seven Atlantic ports have been, in bushels, for the past eight years:

Year.	Northwestern receipts.	Northwestern shipments.	Atlantic receipts.
1877	1,844,306	1,182,741	1,424,453
1878	4,339,889	2,528,517	4,149,867
1879	3,030,710	2,890,223	4,383,816
1880	4,912,230	4,172,194	5,870,868
1881	2,906,494	2,046,187	5,372,157
1882	2,204,634	1,422,283	3,903,314
1883	4,450,982	2,703,396	4,255,516
1884	4,486,653	3,339,566	2,606,217

Thus the receipts of the Northwestern markets for the week this year were 964,000 bushels less than in the corresponding week of last year, and also less than in 1880, but larger than in any of the other five years. The receipts were the smallest for five weeks this year.

The shipments of these markets during this week (during four days of which the regular rate was 20 cents and in two 15 cents per 100 lbs. to New York) were larger than in the corresponding week of any previous year except 1880, and 546,000 bushels more than last year, but 20,000 bushels less than in the previous week of this year. Of the shipments this year 124,323 bushels went down the Mississippi. Only about one seventh of the shipments were wheat.

The receipts of the Atlantic ports for the week this year were 1,629,000 bushels (38½ per cent.) less than in the corresponding week of last year, and, excepting 1882, were the smallest since 1877. They were, however, 558,000 bushels more than in the previous week of this year and were the largest for 15 weeks. The reduction of rates had not been in effect long enough to have a great effect on the Atlantic receipts of this week. The larger part of the increase over the previous week was at Baltimore, whose receipts were 759,579 bushels and 27½ per cent. of the whole, and the largest since September.

Exports from Atlantic ports for the week ending March 22, for five successive years, have been:

	1880.	1881.	1882.	1883.	1884.
Flour, bbls.	67,331	167,676	113,716	138,422	131,051
Grain, bu.	4,465,885	4,345,018	1,298,370	3,386,188	1,150,945

Thus the exports this year are much less than in any other except 1882.

### Coal.

Coal tonnages for the week ending March 22 are reported as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Anthracite	359,058	701,081	D. 342,023	48.8
Eastern bituminous	166,507	179,532	D. 13,025	7.2
Coke	58,213	50,334	I. 7,879	15.7

The system of half-time working in alternate weeks will probably be continued by the anthracite companies until the opening of navigation.

The *Engineering and Mining Journal* says: "The struggle for the steamship business has begun, and promises to be fierce. We understand that the coal shipped via the Rochester & Pittsburgh Railroad and Erie Canal is making a sharp struggle for recognition, and is offered at \$3.30 on board, while Clearfield coal is quoted \$3.35 to \$3.45. In the Clearfield Region, a reduction of wages from 50 to 40 cents per ton has been posted, which may lead to a temporary suspension of mining. It does not seem to affect the market in any way, the low prices named being the basis of contracts for season delivery."

The coal tonnage of the Pennsylvania Railroad for the week ending March 22 was:

	Coal.	Coke.	Total.
Line of road	130,686	52,757	183,443
From other lines	69,939	5,458	75,397
Total	200,625	58,215	258,840

The total tonnage this year to March 22 was 2,790,103 tons, against 2,776,311 tons to the corresponding date last year, an increase of 13,792 tons, or 0.5 per cent.

The anthracite coal tonnage of the Belvidere Division, Pennsylvania Railroad, for the three months ending March 29 was:

	1884.	1883.	Inc. or Dec.	P. c.
Coal Port for shipment	1,554	6,951	D. 5,397	77.1
S. Amboy for shipment	124,566	191,696	D. 67,130	34.8
Local points on N. J. divs.	195,229	205,952	D. 10,723	5.2
Co.'s use on N. J. divs.	46,494	40,928	I. 5,566	13.6
Total	367,843	445,507	D. 77,664	17.4

Of the total this year, 301,576 tons were from the Lehigh Region and 66,267 tons from the Wyoming Region.

Cumberland coal shipments for the three months ending March 29 are reported by the Cumberland *Civilian* as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Shipments from mines:				
Cumberland & Penna. R. R.	296,177	318,289	D. 22,112	7.0
George's Creek & Cum. R. R.	56,108	72,234	D. 16,126	22.4
West Va. Central & Pitts.	92,141	60,709	I. 31,432	51.1
Direct to Balt. & Ohio	430	2,635	D. 2,205	84.5
Total	444,856	453,867	D. 9,011	2.0

Shipments out of region:

	1884.	1883.	Inc. or Dec.	P. c.
Baltimore & Ohio R. R.	371,768	337,113	I. 34,655	10.3
Penna. R. R., Bedford Div.	69,093	91,887	D. 22,794	24.8
Ches. & Ohio Canal	3,995	24,867	D. 20,872	84.0
Total	444,856	453,867	D. 9,011	2.0

Local shipments and consumption are included in the Baltimore & Ohio tonnage in this statement.

Actual tonnage passing over the Huntingdon & Broad Top road for the three months ending March 29 was:

	1884.	1883.	Decrease.	P. c.
Broad Top coal	46,022	56,850	10,828	17.9
Cumberland coal	74,443	101,836	27,393	26.9
Total	120,465	158,686	38,221	23.6

The Broad Top coal is mined on the line; the Cumberland is carried through for the Pennsylvania Railroad.

The *Coal Trade Journal* says of the Grand Trunk contracts, concerning which there has been a great deal of talk: "The Grand Trunk Railway has closed its contracts for the ensuing year by awarding to the Erie Railway shippers, including principally Catfish coal from mines on the River Division of the Allegheny Valley Railroad, in all about 170,000 tons to be delivered at International and Suspension bridges. The Grand Trunk has also awarded to Bell, Lewis & Yates 100,000 tons to be delivered at International and Suspension bridges and 25,000 tons to be delivered at Kingston and Brockville, on the St. Lawrence River. It has also awarded the Rochester & Pittsburgh Coal & Iron Co. about 30,000 tons, which is to be delivered at the bridges. The Erie interest therefore gets about 170,000 tons, and the Rochester & Pittsburgh interest about 155,000 tons, and the Buffalo, New York & Philadelphia interest is left out entirely unless the Erie Railway should divide with it some of the tonnage it has obtained."

### Northwestern Freight Rates.

Mr. W. S. Mellen, General Freight Agent of the Chicago & Northwestern road, has addressed the following notice to agents and connecting lines: "Upon shipments of goods destined to points in Manitoba and Northwest Territory the marks and numbers of each separate package must be shown on the way-bill. This is a requirement of the Canadian customs, and should be strictly complied with."

The Chicago & Northwestern road has issued a new tariff giving rates from Chicago and common points to Duluth and Superior City, Wis., to take effect to-morrow. The rates are: First class, 75 cents; second, 60 cents; third, 45 cents; fourth, 30 cents. New rates, on the basis of 60 cents on first-class business, are announced to LaCrosse and Winona.

### Southern Railway & Steamship Association.

The Executive Committee met in New York, March 27, pursuant to a call. There was a full attendance, and the session was harmonious.

After a full discussion of the matter the Committee decided to make the following reductions on freight rates from Eastern cities to Atlanta:

On first-class freights a reduction of 11 cents.  
On second-class freights a reduction of 10 cents.  
On third-class freights a reduction of 7 cents.  
On fourth-class freights a reduction of 5 cents.  
On fifth-class freights a reduction of 3 cents.

No reduction was made on other classes.  
After the adjournment of the Executive Committee, the Rate Committee held a meeting for the purpose of adjusting rates to all points on the basis agreed on. The reduction above noted is from the basis of March 3 last.

### Cotton.

Cotton movement for the seven months of the crop year from Sept. 1 to March 28 is reported as follows, in bales:

	1883-4.	1882-3.	Inc. or Dec.	P. c.
Receipts	2,661,853	3,259,619	D. 597,766	18.3
Shipments	2,561,809	2,992,601	D. 430,792	14.4
Stock, March 28	141,236	266,917	D. 125,735	46.1
Seaports:				
Receipts	4,382,570	5,329,782	D. 747,212	14.0
Exports	3,294,469	3,690,469	D. 395,970	10.7
Stock, March 28	739,604	863,295	D. 123,701	14.3

It must be remembered that a large part of the receipts at interior markets appears again in the receipts at the seaports.

The *Commercial and Financial Chronicle*, after giving tables to show the actual receipts at ports from the plan-

tions, says: "The above statement shows (1) that the total receipts from the plantations since Sept. 1, 1883, were 4,674,650 bales; in 1882-83 were 5,580,268 bales; in 1881-82 were 4,478,397 bales; (2) that although the receipts at the outports the past week were 52,844 bales, the actual movement from plantations was only 33,311 bales, the balance being taken from the stocks at the interior towns. Last year the receipts from the plantations for the same week were 74,024 bales and for 1882 they were 33,599 bales."

"In the table below we give the receipts from plantations in another form, and add to them the net overland movement to March 1, and also the takings by Southern spinners to the same date, so as to give substantially the amount of cotton now in sight."

	1883-84.	1882-83.	1881-82.	1880-81.
Receipts at the ports to March 28	4,582,570	5,329,782	4,290,640	5,090,626
Interior stocks on March 28 in excess of Sept. 1	92,080	250,486	187,757	255,770

	1883-84.	1882-83.	1881-82.	1880-81.
Total receipts from plantations	4,674,650	5,580,268	4,478,397	5,346,396
Net overland to March 1	461,070	529,556	353,355	415,647
Southern consumption to March 1	190,000	200,000	155,000	135,000

Total in sight March 28 5,325,720 6,306,824 4,986,752 5,896,643

"It will be seen by the above that the decrease in amount in sight March 28, as compared with last year, is 981,104 bales, the increase as compared with 1881-82 is 338,968 bales, and the decrease from 1880-81 is 570,723 bales."

### Reasons for the Reductions in East-Bound Rates.

The following circular, from Commissioner Fink, has been published:

"It seems proper that the members of the Joint Executive Committee should be advised of the grounds upon which the late reductions in east-bound rates have been made, so that the responsibility for making these reductions may be determined. Accordingly the following statement is submitted: The Pennsylvania Railroad Company demanded that a reduction be made in conformity with Circular 548 in the seventh and eighth class rates, to the basis of 20 cents on seventh class and 15 cents on eighth class, Chicago to New York; they being satisfied that the tariffs on these classes were not being maintained. It has been explained by the Pennsylvania Railroad Company that their demand for a reduction was based on information they had received that the Red Line had named a rate of 20 cents on flour from Chicago to New York; that a contract for a lot of grain, East St. Louis to New York, at 19 cents for New York Central delivery had been made; and that the Chicago & Grand Trunk Company the 18th inst. took 200,000 bushels of grain from Chicago at a rate of not over 15 cents. It was also ascertained that the Chicago & Alton Railroad had taken several hundred car-loads of grain from St. Louis at a reduced rate. The Pennsylvania Railroad Company also requested that the tariff on high wines and tobacco be reduced, basing their action on information received by them that the rates on these articles were not being maintained. The Lake Shore & Michigan Southern Company requested that a reduction be announced in the tariff on grass-seed, they having evidence which satisfied them that the National Despatch had offered reduced rates on that article. The Pennsylvania Railroad Company also demanded a reduction on pig-lead and bullion to the basis of 20 cents, Chicago to New York, on the ground that the rates from St. Louis have been made 23 cents. This information as to reduced rates on pig-lead and bullion seems to be corroborated by the Baltimore & Ohio Railroad Company as well as by the reports received from the Joint Agent at Chicago."

### RAILROAD LAW.

#### A New Application Not Patentable.

In the case of the Locomotive Engine Safety Truck Co. against the Pennsylvania Railroad Co., the United States Supreme Court decides as follows:

The application of an old process or machine to a similar or analogous subject, with no change in the manner of applying it, and no result substantially distinct in its nature, will not sustain a patent, even if the new form of result has not been before contemplated.

In trucks already in use on railroad cars, the king-bolt which held the car to each truck passed through a bolster supporting the weight of the car, and through an elongated opening in the plate below, so as to allow the swiveling of the truck upon the bolt, and lateral motion in the truck; and the bolster was suspended by divergent peudent links from brackets on the frame, whereby the weight of the car tended to counteract any tendency to depart from the line of the track. Held, That a patent for employing such a truck on a locomotive engine with fixed driving-wheels was void for want of novelty.

#### Public Highway—Occupancy by a Railroad.

In the case of the Louisville, New Albany & Chicago Co., appellant, against White, the Indiana Supreme Court has just given its decision. This was an action by appellee to recover the value of stock killed on appellant's road. Appellant's road was built for a distance of two miles on an old state road which was never completed, the right to do so being given the company by the County Commissioners. Appellant contends that it only used a portion of the highway, the other portion parallel with its track being used by the public, and that it could not fence the track at the place complained of. The fact that the Commissioners gave the Company the right to lay its track on the road; that no work was done on the road afterward; that there has been an acquiescence in the company's occupancy by all parties for more than 30 years, and that at certain points, owing to cuts and fills, the company necessarily occupied the entire road, were sufficient to justify the jury in finding that the old road was abandoned by the public and ceased to be a public highway. (37 Ind., 95.) Judgment affirmed.

#### Common Carrier—Riots.

The case of Bartlett against the Pittsburgh, Cincinnati & St. Louis Co., just decided by the Indiana Supreme Court, is a reminder of the railroad riots of 1877. The decision of the Court is reported as follows, affirming the judgment of the lower court:

Action by the appellant against the appellee to recover damages occasioned by the delay in the shipment of bogs from Louisville, this state, to East Liberty. A party has no ground of complaint at the overruling of his demurer to a pleading, if, upon trial, it affirmatively appears from the record, that the pleading was found not to be true. Where suit is brought against a common carrier to recover damages for the non-delivery of goods received by it for carriage, and the complaint merely alleges a breach or the common law duty of such carrier, if the evidence shows the goods were received for carriage under a special written



contract the variance is fatal and the plaintiff cannot recover. The appellant could not have recovered under the first paragraph of his complaint; there was no harm in sustaining a demurrer to it. The facts in this case were that the appellant shipped 265 head of hogs in July, 1877, and the hogs were taken as far as Columbus, Ohio, where, by reason of the strike and riots they were delayed 12 days and 58 died, and the others fell off in weight, etc. The appellant sued in this action for damages, and the company defended on the ground that the riots were of such a nature that it could not control it and the delay and damage was caused thereby. The fourth paragraph of the complaint charged that the appellant being ignorant of the extent of the riots applied to the agent for shipment and was shown a copy of an order made July 20, by Superintendent Miller to the effect that the agent could now receive and forward live stock. The appellant knew of the existence of the riots, with this knowledge he, by his agent, executed the contract whereby he assumed certain risks, among them delays of transportation. Taking the order and contract together, in the light of the surrounding circumstances, their obvious meaning was that the appellee accepted for shipment the appellant's hogs, he assuming the risks referred to, one of which was delay in shipment. A common carrier may, by an express contract, relieve itself from the common law liability except as to consequences of its own negligences. The appellant shipped the stock under an express contract, which relieved the appellee from liability in consequence of delays in transportation, and it is not liable for losses occasioned by such delays. The facts pleaded show that the delay which caused the loss was not the result of appellee's negligence.

#### OLD AND NEW ROADS.

**Alexandria & Washington.**—A dispatch from Washington, April 2, says: "In the United States Circuit Court to-day Judge Hughes rendered a decision, which was concurred in by Chief Justice Waite, in the case of Hay against the Alexandria & Washington Railroad Co. The case involves the question of the guarantee of the bonds of the Alexandria & Washington Railroad by the city of Washington, and the validity of the mortgage executed by the railroad company to J. H. and A. T. Bradley to secure the city for its guarantee. The Court holds that the road must be sold as a whole and the purchase money be separated into two portions, to represent respectively the proceeds of the sale of the old part and the new, and that the respective funds shall be applied as adjudicated, to wit: Debt due the city of Washington, \$151,340; due English creditors, \$102,092; Alexander Hay's judgment, \$79,405; Fowle, Snowden & Co., \$22,785; Alexandria & Fredericksburg Railroad Co., \$59,610."

**Allegheny Valley.**—This company gives notice that the cash fund for the payment of interest due April 1, on the income bonds will be sufficient to pay \$7 on each \$35 coupon. The deficit will be paid in scrip convertible into new bonds under the terms of the mortgage.

**Atchison, Topeka & Santa Fe.**—This company's statement for January (including the Southern Kansas lines) is as follows, the mileage worked being 2,259 miles this year and 2,219 miles last year:

	1884.	1883.	Inc. or Dec.	P. c.
Earnings .....	\$1,172,318	\$1,065,794	I. \$106,554	10.0
Expenses .....	569,064	649,719	D. 80,655	12.4
Net earnings .....	\$603,284	\$416,075	I. \$187,209	45.0
Per cent. of expenses..	48.6	60.9	D. 12.3	...

The statement says: "Commencing with the month of January, 1884, the statements of the earnings of the Atchison Co. will include the earnings of the Southern Kansas system, which for purposes of local economical management will still be operated separately. Eighty-five miles of road, including 45 miles transferred from the Atchison system, were added to the local management of the Southern Kansas system on Jan. 1, 1884. The business of the entire Atchison system is so controlled as to throw the traffic over that line which can most economically transport the business."

**Augusta, Gibson & Sandersville.**—This company last week received bids for grading two sections of its road, one of 10 miles from Augusta, Ga., westward, and the other of 10 miles from Sandersville, Ga., toward the Ogeechee River. Other sections will be let as soon as the location is completed.

**Baltimore & Ohio.**—Both houses of the Maryland Legislature have passed without amendment the bill authorizing this company to build an elevated railroad through the city of Baltimore to complete a connection with the main line and the new Philadelpia Branch. The bill now goes to the Governor and an effort will be made to have him veto it, as a number of property owners on the proposed line are very much opposed to its construction.

**Bedford & Billerica.**—Negotiations are in progress between the people of these two places and the Boston & Lowell Co. for the construction of a branch from North Billerica, Mass., to Bedford. This branch will, for the most part, run on the line of the old narrow-gauge road which was operated for a short time, but was abandoned and the track taken up several years ago. The people on the line agree to contribute enough to pay for the right of way and the grading. The Boston & Lowell Co. will iron the road and furnish equipment. This new branch will connect at North Billerica with the main line of the road and at Bedford with the Middlesex Central Branch, and will give the company a new or second line from North Billerica to Boston.

**Bedford & Bloomfield.**—The Indianapolis Rolling Mill Co., which owns this road, is now, it is said, negotiating for its sale to the Ohio & Mississippi Co. An extension of a few miles will be required to connect it with this road, and it is thought that it can be made a property of some value chiefly on account of its connection with a number of large stone quarries.

**Boston, Barre & Gardner.**—This company is now making a number of improvements upon its road, rolling stock and road-bed and also has others in contemplation. Three hundred tons of steel rails have been laid recently and 300 more will, it is expected, be put down during the coming summer. A large number of new ties are also being put in and the road rebalanced in many places. The passenger cars are all to be overhauled, thoroughly cleaned and revarnished and the work in this direction has already been commenced. The company's offices at the Union station in Worcester have been renovated and improved in arrangement so that the business of the several departments is greatly facilitated. Changes in the freight yard arrangements and at several stations along the line are now under consideration.

**Buena Vista.**—Contracts for grading and ties for this Georgia road will be received until April 9. Contractors will be required to complete their work by Sept. 1. The grading will be let in two sections of 13 miles each, and the

work is generally light. The line is from Buena Vista in Marion County, Ga., northward to the Central road near Geneva.

**Cape Fear & Yadkin Valley.**—The track laying on the extension to Greensboro, N. C., has been somewhat delayed by the construction of the bridge over Buffalo Creek, but has been resumed and it is expected that trains will run into Greensboro within a week. On the southern extension the track is now laid to Lumber River in Robeson County, 16 miles from the late terminus at Rockfish and 20 miles from Fayetteville, N. C. The bridge over the Lumber River is completed.

**Chicago & Northern.**—This company has filed articles of incorporation in Wisconsin to build a railroad from the Illinois state line in Walworth County northward to some point on the line of the Chicago, Milwaukee & St. Paul in Washington County, a distance of 60 miles.

**Chicago & Northwestern.**—It is said that the directors have under consideration a plan for the purchase of the Chicago, Iowa & Nebraska and the Cedar Rapids & Missouri River roads, now leased. The plan is to exchange Chicago & Northwestern stock for the stock of these companies, which will require an issue of about \$14,000,000 new stock.

**Chicago & Wisconsin.**—This company has filed articles of incorporation to build a railroad from Chicago to the north line of the state of Illinois on the line between McHenry and Lake counties. From that point it is to be extended by a company recently organized in Wisconsin.

**Cleveland, Columbus, Cincinnati & Indianapolis.**—At a meeting of the board held April 1, it was decided not to make any stock dividend. It will be remembered that the question was brought up at the annual meeting and referred by the stockholders to the board. President Devereux stated that the company was now in a condition in which all the net earnings can be applied to dividends, and he expected that the company would be able to prepare them regularly hereafter.

**Dakota & Great Southern.**—This company is securing subscriptions along the line of its projected road, receiving them either in land or money. It has agreed to locate its road through the town of Lisbon provided \$100,000 can be taken in that town.

**Delaware, Lackawanna & Western.**—This company has let a contract to the firm of Delaney & Kennedy, Birmingham, N. Y., for filling up all its ties in Buffalo. The work will take some time, as there are 10 or 11 miles of these elevated tracks in Buffalo and Black Rock to be filled. The contractors have already begun work.

**Denver, Utah & Pacific.**—An agreement has been completed for the consolidation of the Colorado Northern Co. with this company. The capital stock of the consolidated company is fixed at \$6,000,000. It owns a line from Denver, Col., to Longmont, 34 miles, and it is proposed to extend this road into the Middle Park as soon as possible.

**Detroit, Mackinac & Marquette.**—The extension of this road built under the charter of the Marquette & Western Co. is now completed from Marquette, Mich., westward to Ishpeming, 16 miles, with the exception of the crossing of the Northwestern tracks at Negaunee. The depot at Ishpeming is nearly completed. The trouble about the crossing in Marquette has been settled and the crossing put down. The new ore dock at Marquette is nearly completed and will be ready for use by the opening of navigation.

**Fargo Southern.**—Land has been purchased in Fargo, Dak., by this company, for shops, round-house and other buildings. A bridge 800 ft. in length is being constructed across Long Lake. The work of completing this road will be begun early in the spring. A contract has been concluded by which Flaudreau, Dak., becomes the southern terminus of the road. This is said to have been brought about by granting to the railroad a large interest in the town site.

**Fitchburg.**—Surveys have been made for a branch line from this road at Gardner, Mass., to Westminster, a distance of 4½ miles. It is understood that the Fitchburg Co. has agreed to lay the rails, if the people interested will grade the road.

**Florida Midland & Georgia.**—The grading on this road is now in progress with a considerable force. The road-bed is completed for six miles from Madison, Fla., and work is in progress on a bridge over the Withlacoochee River. The working force is being increased as fast as possible, and it is expected the grading will be finished to Valdosta, Ga., within a month. The engineers are now locating a line north of Valdosta.

**Grand Rapids & Indiana.**—At a meeting of the directors in Grand Rapids, Mich., March 28, the President announced that the suits with the Pennsylvania Railroad Co. had been amicably settled and that the coupons on the unguaranteed first-mortgage bonds, the payment of which had been suspended on account of this suit, would be paid April 1.

**Hartford & Harlem.**—The New Haven (Conn.) *Palladium* says: "The Hartford & Harlem Co., which contemplated connecting with the New York & New England for a Boston outlet, has an application before the present Legislature for power to purchase the stock and bonds of the New Haven & Derby Railroad, and also of the Connecticut Central Railroad, running on the east side of the river from Hartford to Springfield. Special power must be granted for this, as the general railroad law expressly prohibits such acquisition by corporations formed under it of the franchise of companies already existing. This action of the Hartford & Harlem was taken without consultation with other parties in interest, the first intimation of the scheme to the officers of the Derby road being given them by the legislative reports. The same is probably true with regard to the Connecticut Central, now known as the Springfield Branch of the New York & New England. The obvious motive of the Hartford & Harlem people in their effort to get hold of this road is to so hedge that in case future changes in the New York & New England are adverse to their interests, they may still have a route open to Boston via Springfield. Their scheme has passed the House successfully, and will come before the Senate this week. It is a significant fact in this connection that prior to this action of the Hartford & Harlem the Boston & Albany had taken the initiatory steps toward securing right of way for a road from Enfield to the state line at Greenwich. No movement has been made by them since the action of the Hartford & Harlem, and the inference is a fair one that the latter scheme simply takes the wind out of the first to the satisfaction of the Boston & Albany."

**Hobart Branch.**—This company has been organized to build a branch line from the Ulster & Delaware road at Stamford, N. Y., to Hobart, in Delaware County, a distance of 7 miles.

**Hopkins.**—The purchasers of the property of the Burlington & Ohio River Co. at the recent foreclosure sale have organized the Hopkins Railroad Co., with \$80,000 capital stock, and propose completing the road from Gillespie, Ill., to Scottsdale. Most of the grading between these two points is done; the distance is about 30 miles.

**Illinois Central.**—This company has concluded a contract with Pullman's Palace Car Co., under which the cars of the Pullman Co. will run over all the lines of the Central road, beginning April 1. The Pullman Co. will take all the sleeping cars now owned by the Illinois Central. Heretofore the Pullman cars have run on the company's St. Louis line while the company has run its own cars on the Sioux City line, and on the New Orleans line the cars of both companies have been run. Under the new agreement the Pullman Co. will take the entire service.

**James River Valley.**—Arrangements have been made to begin work on this road from Ordway, Dak., northward to Jamestown, to connect with the Northern Pacific road. The contracts for the grading have been let, work to be begun as soon as the weather permits.

**Kentucky Union.**—The work of tracklaying on this new road was begun last week at Hedges' Station, Ky., on the Chesapeake & Ohio road. The company expects to have the track laid from Hedges' to Clay City, 23 miles, within a month, the grading being all completed.

**Lehigh Coal & Navigation Co.**—This company has sold to Drexel & Co., of Philadelphia, \$1,000,000 in new 4½ per cent. bonds. These bonds are a special issue, the security being the same as that of the consolidated mortgage. The proceeds are to be used for paying off the floating debt and will be sufficient for that purpose. The company paid on April 1, \$381,840 of the first-mortgage loan, which was not extended.

**Memphis & Charleston.**—The shops of this company in Memphis, Tenn., were destroyed by fire on the night of March 28. The main building was of brick, 300 ft. long and 100 ft. wide, and was entirely destroyed, with all the machinery which it contained and two new engines, one of which was nearly finished. The loss is estimated at about \$100,000. It is supposed that the fire was started purposely, and some men who were recently discharged are suspected. The round house caught fire and was badly damaged, but a number of engines in it at the time were saved.

**Mexican Central.**—The remainder of the first mortgage bonds due to subscribers (\$4,308,000) are to be delivered this week. This will make the total amount of first mortgage 7 per cent. bonds outstanding \$36,775,000, including the \$2,000,000 paid to the holders of the original concession and excluding the \$2,000,000 deposited as collateral to secure the recent loan. The income bonds and stock will be delivered some time next month. The total issue of stock and income bonds convertible into stock under the present contract will be \$41,183,800.

**Mexican National.**—It is said that holders of about \$9,000,000 of the \$19,330,000 first-mortgage bonds have agreed to the company's proposal to fund six coupons, beginning with the one which fell due April 1. No coupons were paid on that date. President Palmer has issued a circular to the bondholders, stating that the earnings have not come up to expectations on the Southern Division, but have been better on the Northern Division. The company has no floating debt other than the usual current accounts and a small amount on account of coupons. The road can receive money from net earnings, subsidy and fresh capital, and all this money should go to construction.

Despite certain reports which have appeared to the contrary in some home papers, the company is at the present time doing absolutely nothing in Mexico, and has not been for some months. Expenses have been cut down to the very lowest limit and all construction force discharged. In view of the fact that the portion of the road now constructed includes practically all the difficult and costly work, this is significant and very unfortunate for the enterprise. Of the 360 miles, or thereabouts, which remain to complete the main line, about 20 miles are tolerably heavy work, 40 miles are quite easy grading, and the remaining 300 miles are the lightest kind of surface work, the cost of which to sub-grade is only a few hundred dollars per mile.

**Mexican Railroad Notes.**—The following notes are from the *Mexican Financier* of March 15:

Six hundred laborers are at work on the Central Tableland Railway between here (city of Mexico) and Tlalcala.

The Inter-oceanic Railway, Morelos Division, will soon resume work on its branch to Cuernavaca and promises to have it finished within six months. The branch is now built as far as Yautepac. The company expects to have its line to Acapulco finished in two years.

The concession of Gen. Carbo for a railway from the port of Mazatlan to a junction with the Mexican Central's Pacific line at Tepic is one of the best subsidized lines in Mexico, having been granted \$7,000 a kilometer from the federal government, \$2,000 a kilometer from the municipality of Mazatlan to the first point in the district of Tepic, \$2,000 from the state of Sinaloa for every kilometer constructed within the state, and \$1,000 a kilometer from the city of Rosario for every kilometer between that point and the boundary of the state.

**Mille Lacs & St. Paul.**—It is proposed to build a railroad from Brainerd, Minn., by way of Mille Lacs and Princeton to St. Paul, a distance of 110 miles. Several meetings have been had at the towns along the proposed line, and a considerable amount has been subscribed to the stock. It will run through a very good country which is now without a railroad.

**Minneapolis & St. Louis.**—The contract has been let for an extension of the Pacific Division of this road from Morton, Minn., northwest 80 miles. The line will be between the Hastings & Dakota Division of the Milwaukee & St. Paul and the Winona & St. Peter Division of the Northwestern road. This extension will be carried through into Dakota.

**Mississippi Railroad Commission.**—In Jackson, Miss., April 1, counsel for the Illinois Central Co. filed a bill in the United States Circuit Court asking for an injunction to restrain the lately appointed Railroad Commissioners from interfering in any manner with the operation of the road. A similar bill is in preparation by the Mobile & Ohio Co., and the same action will be taken by the Mississippi & Tennessee, and the Natchez, Jackson & Columbus companies.

**New Castle Northern.**—Mr. J. P. Simpson, contractor for the construction of this road, has begun suit in the United States Circuit Court at Pittsburgh to enforce his contract, and asks for the appointment of a receiver for the company. It will be remembered that at the annual meeting last January there was a split, and two boards of directors were chosen, each of which claimed to be the legal board. Several suits have been begun by both parties, and Mr. Simpson now brings suit in order to determine his standing as contractor.

On March 29 the court granted the application and



appointed Mr. D. W. C. Carroll, of Pittsburgh, Receiver of the property of the company.

**New Mexico Central & Northern.**—For some time past Mr. W. G. Corbin, claiming to be President and General Manager of this company, has been in the East endeavoring to make contracts for a large amount of material and rolling stock for his road, which he said was to run from Pueblo, Col., through New Mexico and Texas, as an extension of the Denver & New Orleans road. Mr. Corbin seems to have established his headquarters in Buffalo, where he made an agreement with Mr. D. C. Blackman, General Agent of the Union Pacific in that city, to take a position as General Superintendent of the new road. He also made agreements with a number of persons to take subordinate positions on the road. Buffalo railroad men, however, consider Mr. Corbin's actions as extremely suspicious, as he gave references in that city to several well-known banking houses in New York and upon inquiry those houses knew nothing of him. He also endeavored to exchange annual passes over his projected road for passes over other lines which are in a little more active operation, and in many cases is said to have secured small loans from parties whom he appointed to positions on his road. Railroad men who have written to New Mexico have also received information that nothing whatever has been done on the road, and the lease of the Denver & New Orleans, which Mr. Corbin said had been concluded, existed entirely in his own imagination. Some of the contracts which he offered to make for locomotives and rails have been respectfully declined by manufacturers.

**New York & New England.**—The Receiver makes the following statement for the month of January:

	1884.	1883.	Inc. or Dec.	P. c.
Earnings.....	\$246,705	\$245,681	1	\$1,024 0.4
Expenses.....	225,141	274,787	D. 49,646	18.1
Net or deficit.....	N. \$21,624	D. \$29,106		
Per cent. of exps.....	91.2	111.8	D. 20.6	

The net gain for the month was \$50,730 as compared with last year.

**New York, West Shore & Buffalo.**—In the suit of Robert H. Moore and others, against this company and the North River Construction Co. for a large amount claimed for the materials in labor furnished in constructing the road, argument was heard in Utica this week in the United States Circuit Court on the question of remanding the question to the state court and on a motion made by the West Shore Co. to dissolve the injunction granted, and to prevent any transfer of its property. The Court took the case under consideration.

**Northern (New Hampshire).**—The report that arrangements have been made for a lease of this road to the Concord Railroad Co. is officially contradicted. The question of a lease or operating agreement was discussed some time ago, but no conclusion was reached, and the subject has been dropped and has not since been brought up.

**North Carolina Lumber Roads.**—In the list of these roads which we published recently, taken from the Raleigh News and Observer, mention was made of a road running from Sans Souci in Bertie County, of which information was desired. This information has now been received and is to the effect that the road was taken up some time ago, but the material was used in building another lumbering road owned by the firm of Greenleaf, Johnson & Sons, as follows:

**Chowan & Cashie.**—This new road extends from a point on the Cashie River in Bertie County, which has been named Howard, northward 8 miles into Hertford County. It is of 3 ft. 6 in. gauge, and is used for hauling lumber. The owners have a charter for the extension of the line to Winton, N. C. Mr. Howard Johnson, of Berkeley, acts as Manager of the road.

**Ohio & Mississippi.**—In the United States Circuit Court in Chicago, March 29, a final order was entered discharging the Receiver and turning the road over to the company. As heretofore noted, the Receiver's assets are sufficient to meet his debts, and the company gives security for payment of certain intervening claims which are still to be passed upon by the Court.

The company gives notice that all overdue coupons will shortly be paid, with interest from the date of their maturity.

The Receiver's statement for February is as follows:

Cash on hand, Feb. 1.....	\$48,341
Receipts from all sources.....	350,617
Total.....	\$398,958
Disbursements.....	322,089
Cash on hand, March 1.....	\$76,869

The receipts exceeded the disbursements by \$28,528 for the month.

**Ohio River.**—The damage done to this new road by the floods in the Ohio has been in great part repaired. Most of the track is laid, and work is being pushed at all points where it is not completed. The line along the river at Parkersburg is now being put in order and the company hopes to have the road ready by June 1 next.

**Oregon Railway & Navigation Co.**—Reports come from Oregon that the Central Pacific Railroad Co. has secured a controlling interest in the stock of this company. It is probably the case that a considerable amount of the stock has been bought in the Central Pacific interest but further confirmation of these reports is needed.

**Pacific Railroads and the Government.**—A dispatch from Washington, April 1, says: "The Commissioner of Railroads has prepared an estimate for the use of the Senate and House committees dealing with the proposed funding of the subsidy bonds of the Central and Union Pacific railroads. It shows approximately the amounts which would be payable under the Edmunds bill, and has also a calculation which shows approximately the difference in the amounts which would be realized to the government at the maturity of the bonds under the Thurman bill and under the proposed funding bill. Taking the Central Pacific Mr. Armstrong fixes its total debt at the maturity of the subsidy bonds, say Oct. 1, 1898, at \$68,670,788. The interest on the whole subsidy debt to maturity being already charged, the new principal should bear interest on only so much as matures after the date of maturity of the subsidy bonds. The Edmunds bill proposes that the whole ascertained debt shall be divided into 120 semi-annual payments, of which 28 would mature up to Oct. 1, 1898, leaving the amount to bear interest \$52,647,603. Add to this interest at 3 per cent. per annum on the payments maturing to Oct. 1, 1944, when the last payment becomes due, \$36,701,535, and then the non-interest-bearing part of the new principal, \$16,023,183, it makes the total new debt, principal and interest, under the Edmunds bill, \$105,375,322. As the bonds of redemption are to be of equal value, by dividing \$105,375,322 into 120 equal parts Mr. Armstrong finds the value of each new semi-annual bond to be \$878,127, or \$1,756,255 per annum.

Under the Thurman act the balance due at maturity is stated at \$53,491,515. A comparison of credits from Oct. 1, 1894, to Oct. 1, 1898, shows a balance in favor of the Edmunds bill of \$9,408,308. In stating the account of the Union Pacific Mr. Armstrong finds difficulty by reason of litigation still pending. But giving the company credit for all amounts actually reimbursed to the government and omitting all disputed accounts he figures with the following result: Under the Edmunds bill the Union Pacific debt, principal and interest, will be \$119,710,372. Dividing this into 120 equal parts the value of each new semi-annual bond is found to be \$997,596, or \$1,995,172 per annum. Under the Thurman act (including repayments by Kansas Pacific under the act of 1864), the total debt and interest at maturity of the Union Pacific is \$93,910,623. Balance due at maturity \$57,544,181. A comparison of credits from Oct. 1, 1894, to Oct. 1, 1898, shows a balance in favor of the Edmunds plan of \$7,463,977. The House Committee will consider these figures to-morrow, in connection with the report of the sub-committee, which recommend an increase of the payments now required under the Thurman act, and is not in favor of an extension of time."

**Palisades.**—This is a suburban road projected to run from the New York, West Shore & Buffalo depot at Weehawken, through Fort Lee and Englewood to Alpine, 13 miles. The estimated cost of the road, exclusive of equipment, is \$275,000. Stock to the amount of \$100,000 cash has now been subscribed, and about four-fifths of the right of way is secured. The contractor states that he expects to begin work in a short time and complete the road-bed this summer. The road is to be standard gauge, 56-lb. rails, maximum grade 126 ft. to the mile. A contract has been made with the West Shore for terminal facilities at Weehawken, and it is also expected to make use of the Weehawken Branch, purchased by the West Shore Co. from the Erie, by which access will be had to the Erie and Pennsylvania ferries. The distance from Englewood to the West Shore ferry house is 8 miles, whereas the distance from Englewood to the Erie's ferry by the Erie's line is 18 miles. The contractor is Mr. Geo. F. Seward, No. 171 Broadway, New York.

**Pennsylvania.**—This company's statement for February shows for that month, as compared with February, 1883, on all lines east of Pittsburgh and Erie.

A decrease in gross earnings of.....	\$285,482
A decrease in expenses of.....	73,367
Net decrease.....	\$212,115

For the two months ending Feb. 29, as compared with the corresponding period last year, the same lines show:

A decrease in gross earnings of.....	\$640,606
A decrease in expenses of.....	123,569
Net decrease.....	\$517,037

Carrying out these differences we have the following statement:

February:	1884.	1883.	Decrease.	P. c.
Earnings.....	\$3,428,713	\$3,712,195	\$285,482	7.7
Expenses.....	2,302,154	2,375,521	73,367	3.1
Net earnings.....	\$1,126,559	\$1,336,674	\$212,115	15.9
Two months:				
Earnings.....	\$7,000,946	\$7,641,532	\$640,606	8.4
Expenses.....	4,710,251	4,833,820	123,569	2.5
Net earnings.....	\$2,290,695	\$2,807,732	\$517,037	18.4

All lines west of Pittsburgh for the two months of 1884 show a deficiency on all liabilities of \$256,607, being a decrease of \$379,881 as compared with the corresponding period of last year.

A short section of the new Schuylkill Valley Branch has been opened for business. It extends from the main line at Fifty-second street in West Philadelphia northward, crossing the Schuylkill River at Manayunk to Bala, at which point trains will stop for the present. The distance from Fifty-second street to Bala is 1 1/4 miles, and from the Broad street station 5 1/4 miles. The track is laid for about three miles from Fifty-second street, and construction trains are at work on this section. Track-laying is also in progress at several other points.

Work has been begun on the branch running from this company's north and west branch road at Nanticoke, Pa., to Morgantown, five miles. At Morgantown a new coal town is being built by the Susquehanna Coal Co., and coal will be shipped from that point at an early date.

The company has been having a number of surveys made, and it is said that it will build a cut-off or loop line leaving the main line near Waverly, N. J., and running through the central part of Elizabeth, crossing the New Jersey Central on a bridge near the Spring street station, thence running to the westward of the Long Branch road to the main line near Rahway. The object of this cut-off, if it is really to be built, is to avoid the Central Railroad grade crossing at Elizabeth, and for use as a loop line over which freight and through trains can be sent, leaving the old line for use by local trains.

**Philadelphia & Reading.**—In 1880 the New Jersey Central Co. leased the Summit Hill Railroad, better known as the Switch Back, extending from Mauch Chunk, Pa., to Summit Hill, to Theodore L. and Henry J. Mumford for four years with the privilege of renewing for an additional five years. Recently the lessees notified the Philadelphia & Reading Co., as lessee of the Central, that they desired to renew, but were informed that the renewal of the lease would not be allowed. They have now filed a bill in equity against the railroad company to declare the lease binding and to enjoin any interference with their possession. They claim to have expended a large sum of money in improvements on the road, which is used chiefly for pleasure travel in the summer. This Switch Back road was originally used to carry coal over the mountain to Mauch Chunk, but its use for that purpose was superseded by the purchase of the Nesquehoning Valley Tunnel.

This company's statement for February and the three months of its fiscal year from Dec 1 to Feb. 29 gives the earnings of its railroad lines as follows, the New Jersey Central being included this year, but not last:

February:	Reading.	1884.	Total.	1883.
Earnings.....	\$1,236,940	\$765,402	\$2,002,342	\$1,453,862
Expenses.....	889,450	474,267	1,363,717	827,766
Net earnings.....	\$347,490	\$291,135	\$638,625	\$626,096
Three months:				
Earnings.....	\$4,298,491	\$2,197,294	\$6,495,785	\$4,858,009
Expenses.....	2,754,763	1,457,707	4,212,470	2,717,962
Net earnings.....	\$1,543,728	\$739,587	\$2,283,315	\$2,140,047

This shows for the Reading lines proper for the three months a decrease of \$559,518, or 11.5 per cent. in gross earnings; an increase of \$36,801, or 1.4 per cent., in expenses, and a decrease of \$596,819, or 27.8 per cent., in net earnings.

The Central rental was \$471,817 for February, and \$1,426,140 for the three months, showing a deficit of \$180,682 for February, and \$686,553 for the three months on that line.

The statement for the Philadelphia & Reading Coal & Iron Co. is as follows:

	February.		Three months.	
	1884.	1883.	1884.	1883.
Earnings.....	\$956,779	\$923,319	\$3,346,254	\$2,944,367
Expenses.....	1,047,556	919,334	3,334,808	2,945,673
Net or deficit	D. \$90,777	N. \$3,985	D. \$288,554	D. \$1,306

Net or deficit... D. \$90,777 N. \$3,985 D. \$288,554 D. \$1,306

This shows for the two months an increase of \$101,887 or 3.4 per cent., in gross receipts; an increase of \$589,135 or 13.2 per cent., in expenses, and an increase of \$287,248 in the deficit.

For both companies together the statement is as follows, including the Central lines this year:

	February.		Three months.	
	1884.	1883.	1884.	1883.
Earnings.....	\$2,959,121	\$2,377,181	\$9,542,039	\$7,802,376
Expenses.....	2,411,273	1,747,100	7,547,278	5,063,635
Net earnings...	\$547,848	\$630,081	\$1,994,761	\$2,138,741

Net earnings... \$547,848 \$630,081 \$1,994,761 \$2,138,741

The general result for the three months was thus an increase of \$1,739,663, or 22.3 per cent., in gross earnings; an increase of \$1,883,643, or 33.2 per cent., in expenses, and a decrease of \$143,980, or 6.7 per cent., in net earnings. The expenses above do not include anything for interest or rentals. If the New Jersey Central rental for the three months be deducted, the amount remaining is \$568,621, which is less than the net earnings of 1883 by \$1,570,120, or 73.4 per cent.

The falling off is chiefly due to the reduction in coal shipments by short time working this year, but there was also some loss on travel and general freight business. The coal reduction affects the Central as well as the Reading lines.

**Philadelphia, Wilmington & Baltimore.**—Surveys have been completed for a branch from this road at a point near Aberdeen, Md., running through Harford County to Delta. The object of the branch is to reach the slate quarries at Delta and also a considerable tract of country from which quantities of fruit are shipped in the summer time.

**San Francisco & New Almaden.**—This company has been organized to build a railroad from New Almaden, Cal., to some point on the navigable waters of San Francisco Bay, and also to operate a steamboat line from the terminus to San Francisco. The office is in San Jose, Cal. Its capital stock is \$500,000. The road will be about 35 miles long.

**Toledo, Cincinnati & St. Louis.**—Mr. John Felt Osgood has resigned his position as chairman of the bondholders' committee and will withdraw from active connection with that committee. Mr. Osgood undertook the difficult task of saving this property as a unit and by hard work he had nearly completed a plan for the reorganization of a company in such a way that the road could be held together. These plans had progressed so far that proxies would soon have been asked ordering the committee to foreclose the mortgages and organize a new company. Objections were raised to the plan by parties holding large interests in the securities of the different divisions, and Mr. Osgood, it is said, finding it impossible to secure harmony by any admissible concessions and objecting to act otherwise in the interest of all the bondholders, tendered his resignation and turned over all the papers in his possession to the committee.

The bondholders' committee has completed a report on the present condition of the road. It is based upon the recent examination of the line by a sub-committee and by two engineers employed by them. The report divides the system into two sections, the western from Toledo to St. Louis, and the southern comprising all the divisions and branches on the line south of Delphos, O. The condition of both divisions in the matter of rails, road-bed and ties, is so bad as to make the running of trains irregular, and until recently most of the business transacted has been handled at a loss. The sub-committee says that it is doubtful whether there has ever been a month since any portion of the road was completed when anything above the ordinary expenses was earned. The road had really never been finished and its earnings have been so scanty that no renewals or improvements have been possible. The committee think that it is scarcely possible to pay for the successful operation of the road under a receiver while the road is in its present condition and they also think that the narrow gauge has been a great drawback to its success. They recommend that all future efforts should be in the direction of the change of the road to standard gauge from Toledo to St. Louis, which will enable the road to accept business at the numerous crossing points, and to compete and pool with others upon a fair basis at the terminal points. The experts present two reports: one of them, Mr. Latcha, estimates that the cost of bringing the road up to proper condition from Toledo to St. Louis on its present gauge will be \$2,407,000, and for putting it in good condition and changing to standard gauge \$3,582,000. Mr. Caten, the other expert, makes a somewhat more moderate estimate, putting the bringing of the road into proper condition as a narrow gauge at \$1,518,800, and for alteration to standard gauge at \$2,886,600. To either estimate is to be added \$2,163,000 for terminal accommodations and equipment, the latter being put at 80 engines, 35 passenger cars and 3000 freight cars. It is estimated that the Southern Division can be made a standard gauge and put into good condition for about \$800,000, provided arrangements can be made with the equipment bondholders who own all the rolling stock on this division.

The Receiver's statement for February shows total receipts of \$127,768 (including a balance of \$83,309 from the previous month) and disbursements of \$102,779, leaving a balance of \$24,989 on hand.

**Vicksburg, Shreveport & Pacific.**—Track on this road is now laid to Bayou Danchitte, La., just north of Lake Bisteneau, 24 miles westward from the late terminus at Arcadia and 12 1/2 miles from the Mississippi River. The grading is now all completed to Shreveport, 23 miles from the present terminus, and the track laying will be completed in a short time, unless delayed by high water.

**West Jersey.**—This company makes the following statement for February and the two months ending Feb. 29:

	February.		Two months.	
	1884.	1883.	1884.	1883.
Earnings.....	\$67,186	\$62,056	\$136,486	\$123,875
Expenses.....	41,480	42,051	85,880	82,298
Net earnings.....	\$25,706	\$20,005	\$50,606	\$41,577
Per cent. of exps.....	61.9	67.8	62.9	66.4

For the two months this shows an increase of \$12,611, or 10.2 per cent., in gross earnings; an increase of \$3,582, or 4.4 per cent., in expenses, and a resulting gain in net earnings of \$9,029, or 21.8 per cent.

**West Virginia & Pennsylvania.**—It is said that the directors of this projected railroad in West Virginia have made arrangements by which they will receive assistance from the Pennsylvania Railroad Co. in building the road. It will be made an extension of the Pennsylvania's Southwest Pennsylvania branch. It is to run from the Pennsylvania line southward to Clarksburg, W. Va., on the Baltimore & Ohio road.